JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

The Lines of Progress.

THE address with which Mr. Robert Watson inaugurated his year of office as President of the Manchester District Institution is a composition that will, owing to the thoughtful comment and judgment that it contains, receive respectful consideration by all who peruse it. There may be points in it with which all will not agree; but such points are somewhat difficult of detection. When he ascends to a little adverse criticism of things that exist, one has to follow him with endorsement, owing to the philosophic bent of mind that allows the broad view to prevail that circumstances in most things alter cases. It is no use—in fact, it is impolitic—to be held too tightly in the grip of standardization, and to entertain the belief that what is advantageous under one set of conditions is the correct thing for all known circumstances. Such a mistake is often the forerunner of trouble and disappointment, and even of disaster. Mr. Watson is no straight-laced formalist or dogmatist; and he believes, before attempting to apply any general law, in basing his judgment upon the ascertained facts of every particular case.

These are impressions gathered from an address which winds up with the remark, justified by what appears through the full length of the deliverance, "Looking round generally at every phase of the gas industry, there would appear to be signs, not only of present progress in manufacturing and distribution matters, but also of a long-continued and prosperous future." It is a very easy matter for the professional gas man to apply the tests that show how the industry stands in the lines of progress; but it is a matter of even greater interest to us to see how markedly, at meetings of shareholders in gas concerns, the great salient facts as to progress and prospect are in the present appreciated. And further reflection of public opinion is given in the firm position of gas securities in the stock and share market. All over the Presidential Address now before us the word "progress" seems to stand out in capital letters—progress both in the technical and commercial paths, in the latter despite the fact that we cannot name a single branch of the business of the industry in which competition is not now more severe than it was formerly. When it is pointed out (as we have pointed out before) that, during the last twenty years, the consumption of gas has increased by about 100 per cent., when it is pointed out, as it is by the President, that the population of the country has increased by less than 24 per cent. during the same period, while increased applications of gas have almost doubled the average consumption per consumer, we can afford to smile benevolently on those who find consolation in talking of the decadence of the gas industry and of its approaching dismissal from any further part among the agencies of life.

But when we speak of progress as shown by the volumetric test, there is another side to the matter, which found expression in the recent address of Mr. Charles Hussey to the proprietors of the Croydon Gas Company. "The fact," he said, "should not be lost sight of, in considering the increase in the sales of gas, that the value obtained from it by the consumers is greater out of all proportion to the increased quantity sold." Those of us who are allied to the gas industry know this full well; but we do not give sufficient credit to it in taking stock of progress on the quantitative basis. Science has come to our aid in giving greater value for money expended; and the address points to the advances in efficiency of gas for lighting through the incandescent burner, for heating through better knowledge of essentials, and for power through the economies derived from the reclamation of loss. The efficiency in utilization, we venture to think, represents a greater money value to the consumer than the economies of the gas production which the last two or three years have done so much in yielding, and which allow the retailing of gas at prices that in most places were undreamed of twenty years ago. We need not wonder much as to what would have been the position of the gas industry to-day had not electric lighting come along. To speculate in this particular line would be, from the waste of time involved, a most unprofitable occupation. We have, in fact, no grounds upon which such an exercise could be indulged in, because it is quite possible that had electric lighting not have come along, the consumption of gas would not have doubled itself in the twenty years. Sufficient is it that we keep our own house in order, so that nothing shall stem the remarkable progress that we have in hand to-day. And the position of to-day must only be looked upon as the starting-place for the fresh effort of the morrow. So regarding it, there will be no going back.

The President draws attention to certain directions in which special effort should be made on the commercial side. He particularly advocates the fostering of the local sale of coke. A great deal in this line is being done in London and the suburbs. It seems to us quite a time ago since Mr. Corbet Woodall had the system of dealing with coke in paper bags tried in the district of the Gaslight and Coke Company. We are rather afraid that it has not greatly appealed to the residents in "flat land," and that the character of dwellings has a good deal to do with its success or otherwise. The Tottenham Company also introduced the plan; and recent reports at the meetings of the proprietors tell a good story. So also in the case of the South Metropolitan Gas Company. Only at the meeting the other day, Mr. Charles Carpenter told of the gratifying success that was rewarding the application of this method of cultivating a local sale for coke; and his figures are of much interest. But our stove manufacturers who have devoted some attention to this line, will note Mr. Watson's suggestion that a good coke-stove is still a thing desired, which does not show any high estimate on his part of the productions so far put upon the market in this connection. There is no doubt about it that the more the basis of business is broadened, the greater the commercial strength. And the President—as he may rightly do—places some credit for the relief of the coke market to the manufacture of carburetted water gas, which manufacture in this country absorbs no less than 1,500,000 tons of coke. We may class this as being among one of the economic practices of the times; for it also lessens the requirement for coal to the extent of some 2,100,000 tons. We have heard the argument as to this destroying part of the employment in the coal-fields, in delivering the coal, in carbonizing, and in dealing with the products; but those who have so contended do not refrain from lessening their own coal requirement by increasing the yield of gas per ton. It is real economy to get as much out of the coal as possible, and to do something to relieve from products markets that are so often found to be too congested for freedom in the making of transactions. And such economy is needed as a set-off against the less economical conditions of coal production in these times. While speaking of coal, there may be congratulation to Mr. Watson on the prospects of the gas undertaking under his charge through the big development that is proceeding of new collieries in the neighbourhood of Doncaster. This must benefit the concern—a concern that stands, for its size, unique in the history of British gas affairs, in that, until 1904, it had no statutory powers, yet it served the consumers well, and only had an unliquidated capital of £12,000. Sir George Livesey once stated in our columns that statutory powers for the gas industry were really useless; and so they are, if it were not for the protection they afford and the power to do things they confer that would be otherwise illegal, or the performance of which could not be insisted upon as a right. But we rather favour restricting in gas supply statutory control and obligation to the barest of essential limits; and therefore we should be careful in accepting, without full explanation as to all it means, Mr. Watson's suggestion that, as the gas industry's business is now to supply light, heat, and power, there

should be "statutory" supervision right up to the point of ignition. There are gas undertakings that have the right of statutory supervision in the case of new piping and fittings. But it is not obligatory. The principle of supervision is right; it is work that should be done. But the less cast-iron statutory enactment that is introduced into it the better; though, of course, one sees the impotence, in the face of local trading interests, of municipal authorities in doing much that is effective without they have parliamentary right on their side.

The section of the address in which the President is especially good is that in which he deals with matters affecting illumination. We quite sympathize with his aspiration that, in this particular science, there should be some attempt to get down to a common basis of nomenclature and standards. The present confusion only means perplexity; and it is certainly an obstacle to advance. We also want more accuracy and fuller information in stating the candle values of lamps. On the other hand, it depends very much on the purpose for which light may be required as to whether one form or another of testing and expressing illuminating merit is the preferable. We can have no hard-and-fast rules in this connection. For different purposes, the mean spherical illuminating power, or the mean hemispherical power, or the measurement of the power on the horizontal plane may, one or other of the three, be found the most applicable. Distribution is not always required; and concentration is often useful. In the case of street lighting, the President shows that the Westminster specification will not be applicable to street lighting under all conditions; especially in the country where the lamps are widely spaced. We hardly think it was expected that it would be. Where lamps are widely spaced, the rays at and in the neighbourhood of the 10° angle below the horizontal are important; but with the standard heights of lamp columns and the abnormal distances in the country, these rays would not have much effect at midway points between the columns. Where great distances are imperative for running economy, then the question of treatment comes in, and lamp-standards somewhat higher than the normal suggest themselves, in which case the objection to the Westminster specification would be somewhat minimized.

It was an excellent address; and Mr. Watson deserved for it all the encomiums showered upon him at the close of its delivery.

Coal Gas for Train Lighting.

An article that appears in other columns, on "Gas Lighting "for Railway Carriages," may be accepted as the mature views of a railway expert, without any interest in the subject other than that of providing the best means of artificial lighting for the convenience of railway passengers, and for the preservation of their eyes, and the most economical for the railway companies. The hysterical ravings of those interested in electricity, and the expressions of view in the daily papers of many who are incompetent to form a fair judgment, have brought the question of the safety of gas lighting of trains to the fore again; but the writer of the article who has also to make a study of the question from this standpoint declares that there is no tangible proof of danger from the experiences of railway disasters, and that practical considerations show that there is no ground for believing otherwise than that, after the wrecking of a train, the gas is dissipated before fire actually occurs. There has been over this subject a great deal of imagination expended by the foes of gas lighting. But the writer of the article has obviously very little patience with those who endeavour to make business capital out of pure conjecture.

The greater part of the article is given up to discussing the technical progress and prospects of train lighting by gas; and this side of the question has about it several points that will be of interest to our readers, directing as it does to the possibility of still further economy in the lighting of railway coaches, and what is more by drawing supplies from town-gas mains. The inverted incandescent gas-burner has now altogether altered the situation in regard to train lighting; and it has opened up possibilities which have not been appreciated at their proper worth by gas managers. In the first place, the cost of installation per coach is considerably cheaper, as the figures in the article show, than the fitting up of carriages by electricity. The resulting steadiness and uniformity of the light are favourable considerations; another is the fact that passengers' eyes are not distressed by incandescent gas-lights as they are by the intrinsic brilliancy of the electric lamp, nor are their eyes strained by marked changes in the lighting power of the lamps during a journey. It is, too, an extremely interesting testimony to the resisting quality of the inverted mantle that our correspondent is able to state that, on main line trains, the average life of the mantles may be placed at two months, which makes the cost of maintenance very slight compared with electric lamps. The cost of running, too, is lower than in the case of electricity; and this will be further reduced as coal gas displaces oil gas.

This we regard as the chief point in the article before us. The inverted incandescent burner renders unnecessary the high-grade oil-gas that was essential when flat-flame burners were used for lighting; and when one considers the effect of compression on gas rich in illuminating hydrocarbons, it is obvious that its employment for the purpose is uneconomical. It requires special producing plant and charging stations at various places on a railway system; while from town-gas mains (at the places where gas is cheapest) along any railway system, a simple compressor would be able to deliver into the storage cylinders of the railway coaches gas of good calorific power at a much more economical rate than is the case under the present order of things. In France there has been long experience of the use of coal gas for train lighting with incandescent burners; in the Isle of Wight and on the North London Railways, coal gas is employed; and some of the larger and more influential of the British Companies are giving it a trial. This is one of the coming changes in railway lighting that our expert correspondent sees—the supersession of oil gas by coal gas; and gas managers, with low-priced coal gas at their command, should take "Time by the forelock," and ascertain whether there is any likelihood of being able to do business in this particular direction. It is a question of showing economy over the existing order of things.

Gas Coal Prices.

The position of gas-coal contract prices is particularly interesting at the present time. Several of the large London and Suburban Gas Companies have, before the usual period for entering into contracts, closed with offers for either the whole or a large proportion of their anticipated requirements for the year ending in June, 1912, and at prices ("considerably" has been used in more than one instance) lower than those that are ruling under current running contracts. Of course, prices were put up last contract season beyond any point for which there was justification in view of the Coal Mines (Eight Hours) Act; and so the colliery owners have a little margin there with which to make concession. But, on the other hand, general trade demands must be ascending. The trade of the country last year was exceptionally good; the statistics already published as to the volume of the foreign trade and the Board of Trade labour returns together serve as an excellent index. And those who indulge in trade forecasts, predict a busier time still. This being the position, the early closing of many important gas coal contracts at reduced prices, in and about London, beginning with the Gaslight and Coke Company, for the year commencing with next July, is interesting, not to say significant.

We hear of offers (Mr. W. G. Bradshaw also referred to them in his speech at the meeting of the Commercial Gas Company last week) for an early settlement of contracts having emanated from the coal owners; but the reasons for their anxiety to secure the contracts must be more a matter of speculation than of definite knowledge. The contracts of gas undertakings are of the choicest variety. They are good, all-the-year-round ones; and they are not so much dependent on vacillations of trade as are many other contracts which it would not be difficult to name. Then again the spreading policy of supplying lower illuminating power gas has put into the hands of the administrations of gas undertakings a migratory power with respect to contracts that they did not at one time possess. Oil, too, is a factor that has now to be accorded greater importance. Last year from various causes—principally through increased competition, and fresh adventure in the development of oil-bearing regions—the price of oil was low; and there are gas companies who used such a quantity of oil that they saved through it the increased amount that had to be paid for a lessened tonnage of coal. Contracts for oil in several cases have been made for the year ending in June, 1912, at lower prices than those made for the current year. There is an inducement in this, combined with the

fact that a lower illuminating quality of gas is now so largely the vogue, to have greater recourse to the production of carburetted water gas. Perhaps we ought not to suggest it as a factor in the situation; but we must not forget that the Gaslight and Coke Company have proved the feasibility of shipping coal from Germany for gas-making purposes.

Only a few years ago, there was talk of combinations and understandings among coal owners with the view to extract more for coal out of the gas industry; but, having regard to the considerations here advanced, it may have been wisely thought by colliery owners that a friendly attitude is more advantageous than the uncertainties that the gas industry has now the power to introduce into their bargainings for raw material.

The Holborn Contract.

It is to be hoped that we shall be in the position ere long to compliment the Holborn Borough Council on devising a scheme that will, at any rate, partially remove a distinct piece of injustice to one of the competitors for the new public-lighting contract for the district. It was pointed out in our columns a fortnight since wherein this injustice occurred; and we are afraid it can never now be wholly effaced, though a scheme and a specification offering a new foundation for tenders will do something towards bringing the competitors back on to level ground. At the same time, there is this to be said, that the Electricity Supply Companies concerned have shown that they are prepared to go to considerable sacrificing lengths to see the Gaslight and Coke Company shorn of a success in one borough not shackled to an electricity supply undertaking. The position at the moment is this: The Council have agreed to continue the present contract with the Gaslight and Coke Company, subject to a month's notice on either side. A Sub-Committee of the Works and General Purposes Committee have been considering a fresh basis (as presented in our news columns) upon which to invite tenders from the competitors; but as the matter has not as yet been before the Works and General Purposes Committee, it would have been irregular for the Council to have considered the recommendations at their meeting last week. It is clear from this that the Sub-Committee are fully persuaded as to the unfair position that was created, so far as the Gas Company were concerned, by the course of events that resulted in the much-advertised calculated figures on more or less hypothetical requirements, which figures looked strangely in favour of electricity after its repeated defeats in other London areas where private companies were in opposition. We hope that a scheme will be devised that will put the Companies once more on a fairly level footing, though, as we say, the disadvantage imposed upon the Gaslight Company under the circumstances cannot, whatever is done, now be completely removed. In thus referring to the matter, it will not be forgotten that, despite a few hundreds difference in the original figures (which are now evidently to be quashed), the Works and General Purposes Committee of the Council considered that, all things taken into account, the contract should go to the Gas Company.

Sulphur and Lime Purification.

It has not infrequently been stated, before Committees of Parliament, when gas undertakings have been asking for a relaxation of restrictions, that any remission of obligations would be to the perpetual detriment of the consumers. The allegation was a reflection upon the business acumen and capabilities of those who, technically and otherwise, conduct the affairs of the gas industry. Statutory relaxation does not for a moment mean or imply, or is likely to result in, the cessation of all wisdom in the direction that may be in question. But the opposing voice would have it so, until time gave the contradiction. There was parliamentary release a few years ago from the obligation regarding the removal from gas of the sulphur compounds other than sulphuretted hydrogen. To obtain this release, the fight was long and serious; but release did not for a moment mean that those who had obtained it were for ever, whatever the conditions, going to let the sulphur compound content of their gas run loose. Liberty has naturally to be tempered by a prudent discretion. So it has come to pass, notwithstanding the nauseous character of spent lime, that the South Metropolitan Gas Company some time ago partially reincorporated in their purification processes the use of lime, and the Gaslight and Coke Company have also recently supplemented its employment at their works; but in neither case to the extent that it was practised before, as witness the item of purification in the accounts now compared with the period before relaxation came about. This all means that the hope of the past has not been realized under the changed coal conditions and retort-house operations of the present. The day when vertical retort working will be universal is yet afar off. When it does come, then may be the time to rely on oxide purification only. But, meanwhile, under present circumstances, there has been a partial return to lime purification in several instances. The proposal is also now before us from Coventry, on a report by Dr. Harold G. Colman, in which the Engineer and General Manager (Mr. Fletcher W. Stevenson) concurs. Dr. Colman argues the case well, and finds that, all things considered, the most economical plan at present for dealing with justifiable complaint owing to the vagarious movements of the sulphur content of the gas is by reverting to lime. This being so, the Gas Committee have adopted Mr. Stevenson's recommendation that the necessary plant be obtained. The instances cited, of reversion to the old order of things, give the contradiction to the open assertion or cloaked insinuation that gas authorities are not to be trusted to give their customers an article of decent quality without the restraint of parliamentary decree.

Gas Trading among a Mining Population.

The progressive tone of the paper, on "Ideas, Old and New: "Some Methods of Increasing Output," that Mr. E. H. Hudson, of Normanton, read on Saturday before the Manchester Institution, is very much to our taste. He is engaged in the gas business among a mining working class population; and among this population he has substantiated some sound reasoning and views relating to matters that are part of currently debated gas policy. Taking Normanton and its conditions as a line at which business extension work of the character described by the author has been successful, then it follows that all towns whose conditions are approximately the equal, and all towns whose conditions are superior, to those of Normanton, should be able to apply the same methods with advantage. There are some who will shy at Mr. Hudson's bold experiments; but it is only through tentative work that progress in new lines can be effected. There is a proneness among the managements of some—far be it from us to suggest all, for we know right well how lamentably we should err—of the moderate and small gas undertakings to jump to the conclusion that this or that method of business development would be of no use in their particular areas. This is an unfortunate, and all too frequent, attitude. Well as one may imagine that he knows his own district, there is one thing of which he cannot be positive, however great the estimate he has of his own judgment, and that is how a new idea will strike the inhabitants. There must be trial. The hesitancy to make experiment in new business-getting is almost as great an evil as the prejudice that at one time existed among householders in regard to the use of gas for purposes other than lighting, and which has only been cured by the passing of the crude predecessors of the highly efficient articles of the present day. Mr. Hudson speaks of this quondam prejudice; and it reminds us of another reason why in every possible and reasonable direction new business methods should be introduced, at any rate experimentally. They plant in a district new experience; and all new experience that is good is a valuable asset, as it does something in offering an effective resistance to those rivals who are making it their business to create prejudice among gas consumers in order to benefit their own interests.

Some of the methods that Mr. Hudson has introduced are not new to the larger gas undertakings. The character of the population has to be remembered when considering his paper. He finds the free-labour maintenance of incandescent burners pays; and that the incorporation of a cooker in a slot installation forms the most paying part of it, though an average gas consumption of 7500 cubic feet per meter cannot be regarded as high. It is here that Mr. Hudson introduces a new mehod—at all events, for such a district. This is the lending of gas-fires to consumers free of all charges. Round the policy of doing this there will be wide differences of opinion. A profitable case is made out in the paper, so far as the experience has gone. But in these matters the best consumers, as a rule, come on first; and when there is a descent to the class of consumers whose consumption will shrink from that first experienced, the advantage—having regard to capital and maintenance charges—will, we fear

show a tendency to recede. It is the experience with the cooker in the slot installations that has suggested the innovation at Normanton in this matter of gas-fires; but one cooker in an installation suffices. Mr. Hudson's argument, stated briefly, is that, if he puts in a slot installation at an average cost of £6 for an average consumption of 7500 cubic feet per annum, then why should there be any hesitancy in connection with the ordinary consumer to lay out 30s. or 35s. for an average consumption of 10,000 cubic feet. But is he going to stop at one fire for each consumer? It seems that he is not, as he undertakes to fix a fire free of cost in any room in regular use. On first blush, we should have been inclined to think that, with his class of population, the average additional consumption per fire, with more than one fixed in a house, would soon make a difference for the worse to the profit of this class of business. It would be interesting to know whether he has any houses in which more than one free fire has been fixed, and what is the effect upon the consumption. It is worth noting that between a slot consumer's payment for 7500 cubic feet at 3s. 10d., and an ordinary consumer's consumption of 10,000 cubic feet at 3s., there is only a difference of 1s. 3d. in revenue, and the latter consumes 2500 cubic feet of gas more than the former! But, of course, when one takes into consideration capital and maintenance charges on the slot installation and on the single gas-fire installation with the ordinary consumer, there is again a point in favour of Mr. Hudson; and another and important point is that his method is an effectual means of, at any rate, creating the experience which carries conviction to the consumers. So far as trial has gone, Mr. Hudson shows satisfactory financial justification for his scheme. There is no doubt about it that the greatest open field awaiting the cultivation of the gas industry to-day is this one of heating; and in the paper the question of its development is viewed in its broadest light. Given a practicable means of discriminating between gas used for lighting and heating (such means are at hand in the discount meter) Mr. Hudson is also a live advocate for a system of differential prices. Between his own scheme and a differential rate, there is topic for discussion in reference to relative advantage.

In another direction, the author shows himself a pioneer in a district of the character of that with which he has to deal. He has entered upon the business of high-pressure gas supply; and in connection with the nucleus of an installation that he has established, he is seeking now to obtain business that will justify him in extending the main through the centre of the town. With perseverance—and perseverance is manifestly a characteristic of the management at Normanton—we shall hope to hear of this extension being made ere long. The meter that Mr. Hudson describes for obtaining an inferential test of meters *in situ* should form a very useful adjunct indeed to the distribution department, in enabling a survey of the meters, for registration accuracy, to be carried out with dispatch. But we should like to have an account of working experiences with it. It is obvious that the great growth of meters connected through the slot system, adds to the value of test appliances of the kind. The paper will prove a useful one in suggesting lines of business activity in areas largely occupied by a working-class community.

Liverpool Public Lighting—Economy of Controllers.

In another part of the "JOURNAL" will be found some particulars in regard to the public lighting of Liverpool, extracted from the annual report of Mr. A. G. Smith, the Superintendent of Street Lighting, Gas Examiner, and Official Inspector of Gas and Electric Meters to the Corporation. As the city on the Mersey is frequently referred to, when the question of gas *versus* electricity for public lighting is under discussion, as an example of a local authority's preference for gas, even though it is supplied by a private company and there is in existence a municipal electricity undertaking, any information as to the working of the arrangement is interesting. But the report under notice is unusually so from the fact that it bears testimony to the economy and efficiency of the controller system for the automatic lighting and extinguishing of street-lamps. Indeed, Mr. Smith states, at the very outset of his report, that this was the only special feature of the year's work of his department. Before referring to it, however, attention may be directed to the statement that out of a total length of 468 miles of roads lighted last year, 452½ miles had incandescent gas, against 6¾ miles having electric lighting—the remainder (principally back streets) getting their light from ordinary flat-flame burners. There was a net increase of 127 lamps last year compared with 1909; and the cost of maintenance rose from £47,818 to £48,289. Turning to the "feature" of the report, there were 2357 controllers in operation at the close of the past year, against 937 on Dec. 31, 1909, and 272 at the corresponding date in the preceding year; and it is estimated that by next December there will be 4357 of these appliances fixed. It will now be interesting to look at the financial side of the question; and on doing so we find that the effect of the use of controllers has been to reduce the charge for the maintenance of the lamps fitted with them to 10s. last year, against 10s. 7d. in 1909. It is satisfactory to be assured by Mr. Smith that this result has been attained without the dismissal of any men. Apart from the saving effected by the use of controllers, they have been the means of affording relief from the trouble of naphthalene deposits. During last year there were 694 reports of failures in the gas supply to public lamps from the cause named; but we are told this is a large reduction in the number, and it is attributed to the system of automatic lighting, as there was "not a single instance of a stoppage in the new lamps." The significance of this feature of the controller system does not require emphasizing. The other matters dealt with in the report do not call for special notice. It only remains to say that the net expenditure of the department under Mr. Smith's supervision last year was £52,536.

The Weald Prospectus.

Though it had been hoped that gas company promoting, with to the gas expert a financially unhealthy appearance, would have succumbed under the mass of *débris* and financial loss left as a warning by previous exploiters, it can hardly be surprising that now and again a fresh effort should be made that does not appeal as being altogether irreproachable. The first thing to raise suspicion is the promise, or estimates presented, of luxurious dividends; and when it is seen that there is an attempt to tickle the cupidity of people with an estimated and enormous dividend of 8 per cent. on cumulative preference shares and 10 per cent. on ordinary shares, in a venture that has as its nucleus the Burwash Gas-Works in the Weald District of Sussex, it is enough to warn off any commonsense person. This venture comes before us as the Weald District Gaslight, Coke, and Coal Supply, Limited; and there is no intention of this concern merely following such a humdrum existence as running the ordinary business of a gas undertaking. It is going to develop into "a wholesale gas manufacturing and supply company" (printed in very black type in the prospectus before us); and that is not the end of its functions. "The Company will also act as wholesale coal merchants and colliery agents." No details are given as to the financial accomplishments of the gas-works of Burwash; but if we turn to the prospectus of the ill-fated Robertsbridge, Salehurst, and Hurst Green Water and Gas Company, Limited (which owed its birth to the Eaton confederacy), it is seen that Burwash was one of the places in which that Company had the right of gas supply.

Further Particulars.

One of the Directors of the new Weald Company is Mr. Ernest Nussey, who was a Director of the South of England Natural Gas and Petroleum Company, and a colleague on that Board was Captain F. Jenkins, D.S.O., whose name figured in directorial capacity on several of Eaton's promotions. The capital of the Weald Company is £6000; but the Directors will be content for the present if they can get the public to take up 2500 preference shares and 2000 ordinary shares. To the vendors there have been allotted as fully paid 250 of the preference shares, which they have kindly accepted in part payment of the purchase money, which appears to amount to £1500, *plus* the value of the stock. The vendors are the London Industrial Contract and Finance Syndicate, Limited, which has in name a striking family likeness to part of Eaton's and Preston's machinery. Its days of existence are as yet but few. Two or three other points from the prospectus will, if it has not already been seen, assist in showing that the new concern does not commend itself to our support. The name of the Company's Bankers is missing from the face of the prospectus. The Articles of Association provide that the Board shall not proceed to allotment unless at least "seven" shares are subscribed for; the Company have the right to pay a liberal commission "not exceeding 50 per cent." on share subscriptions;

and the qualification of a Director need not be more than £20. The preliminary expenses up to and including the issue of shares are estimated at £800, and these expenses are payable by this Company, which we take to mean the Weald venture. We are not by any means favourably impressed by the prospectus.

Valuation Statistics.

It appears from Part I. of the Annual Local Taxation Returns for the year 1908-9, which was issued a few days ago, that during this period the total gross estimated rental for England and Wales (including the "gross value" of rateable hereditaments in London) rose from £263,037,367 to £266,944,896, which was a net increase of 1·5 per cent.; while the rateable value also increased from £212,757,450 to £215,309,542, or to the extent of 1·2 per cent. The increase in London in the gross value amounted to 0·6 per cent., and the increase in the rateable value to 0·5 per cent. As between 1908 and 1909, the rateable value of agricultural land in England and Wales, which had shown a persistent decrease since 1897, exhibited an increase of nearly £59,000; this being the first increase of the kind since the date of the operation of the Agricultural Rates Act, 1896. Between 1905 and 1909, the increase for England and Wales in the gross value (or gross estimated rental) of property amounted to upwards of £18,600,000, and the increase in rateable value to upwards of £12,500,000, of which £10,800,000 represents the increase in urban areas, and £1,700,000 that in rural areas—no allowances being made for alteration of areas. The gross value of property in London increased during the same period by upwards of £3,865,000; and the rateable value, by upwards of £2,753,000. The percentage of increase in the gross value (or gross estimated rental) for the period mentioned was: For England and Wales, 7·5; for London, 7·6. In the case of the rateable value, the increase for England and Wales was 6·2 per cent.; but for London, the growth was equal to 6·5 per cent. Comparing the valuation in 1909 with that which was in force in 1897, it is pointed out that the rateable value of agricultural land diminished during the period of eleven years 1897 to 1908 to the extent of 2·8 per cent.; but as there was an increase in value as between 1908 and 1909, the net decrease in this class of property from 1897 to 1909 was 2·2 per cent. In the case of other hereditaments (excluding the annual value upon which Government contributions were made), the rateable value increased between 1897 and 1909 to the extent of 32·5 per cent. The total rateable value of the rateable hereditaments in England and Wales (exclusive of the annual value upon which contributions in lieu of rates were made by the Government) increased by 27·5 per cent. in this period.

Collieries and the Eight Hours Act.

Though the great majority of people are interested in the results of the Mines Eight Hours Act from the point of view of coal consumers, it may not be amiss to glance for a moment at the opinions on the effects of this much-debated measure which are held by the Chairman of a Colliery Company. Addressing the shareholders at the annual meeting of Messrs. Andrew Knowles and Sons, Limited, it was stated by Mr. R. M. Knowles that the reduction in working hours had had a serious effect upon the output of the collieries, and had consequently increased the cost of production. It had also led to great dissatisfaction and to loss of wages by the miners, who had been told that they were going to earn as much in eight hours as they had been doing in ten. Some of them were silly enough to believe it, only to find that this had not proved to be the case. The financial effect of this legislation on the colliery owners was very serious; and in the Company's collieries the manager estimated the cost of the Eight Hours Act at from £12,000 to £14,000 per annum, which was equivalent to a dividend of 2 per cent. on the capital of the concern. But the Eight Hours Act is not the only thing which tends to increase the cost of the production of coal—at any rate in the case of this Company. There was, the Chairman continued, also the additional burden of workmen's compensation, which last year had amounted to £7693, an increase in rates and taxes of £4000 as compared with ten years ago, and a new tax on freehold coal owned by the Company which would amount to £400 or £500 per annum. The increased burden put on the Company during the last ten years, including the cost of the Eight Hours Act, amounted roughly to £26,000 per annum. This was a larger sum than the shareholders would receive this year in dividend.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 626.)

Business on the Stock Exchange last week, taking the markets all round, was active, with a cheerful tone generally; while some of the leading departments were very strong and buoyant. Conspicious among these was the Railway Market, which, in spite of realizations, pushed prices up steadily. The gilt-edged division was very firm and Consols had a nice advance. A disagreeable incident was the "bolt from the blue" which fell upon the American Market on Friday, in the form of an adverse decision of the Commissioners as to rates; but a recovery seemed setting in the next day. The opening on Monday was promising. Consols rose $\frac{1}{8}$. Railways, after pausing to consider labour questions, resumed their rise; and the Foreign Market was strong on abatement of Chinese alarms. Things were much the same on Tuesday; Rails being conspicuous for activity and strength, and the chief markets steady. Rails were again prominently in front on Wednesday, with much buying and selling. But the demand predominated, and prices rose still more. Consols were higher; and there were bright spots in speculative quarters. On Thursday, Rails were better than ever and reached high-water mark. Government issues were firm, and Consols rose $\frac{1}{8}$ for money and account and $\frac{1}{4}$ for specials. On Friday, the big slump in Americans had an unsettling effect. Rails were more freely sold and gave way a little; but Consols repeated their advance of the day before. Saturday was a quiet day. Consols were unchanged, and Americans calmer. In the Money Market, there was a strong demand for short loans, and rates hardened accordingly; but discount terms grew easier daily. Business in the Gas Market was less in volume, and it was to a remarkable degree confined to the three biggest issues. But everything was very strong; and all changes in quotation were in the upward direction. In Gaslight and Coke, the ordinary was firm and active, prices ranging from 107$\frac{1}{2}$ to 108$\frac{1}{4}$ *cum div.*, and from 105 to 106 *ex div.* In the secured issues, the maximum marked 88$\frac{1}{4}$ *cum div.* and 86 *ex div.*, the preference from 103$\frac{1}{4}$ to 104 *cum div.* and 101$\frac{3}{4}$ and 102$\frac{1}{2}$ *ex div.*, and the debenture from 80 to 80$\frac{1}{2}$. South Metropolitan was more active, and realized from 119$\frac{1}{2}$ to 120$\frac{1}{2}$—a rise of $\frac{1}{2}$. The debenture made 79 and 80$\frac{3}{8}$—a rise of $\frac{1}{2}$. In Commercials, the 4 per cent. changed hands at 115$\frac{1}{4}$ and 116$\frac{1}{4}$, and the debenture at 77$\frac{1}{2}$ free. The Suburban and Provincial group was almost wholly neglected. One deal in South Suburban at 121$\frac{3}{4}$ special, and one (on the local Exchange) in Liverpool "B" at 166 *cum div.*, was all the business of the week. But British, Sheffield, and Tottenham had advances in quotation. In the Continental companies, Imperial was fairly active and quite steady at from 186$\frac{3}{4}$ to 188, European fully-paid was done at 26$\frac{1}{4}$, and ditto part-paid at 19$\frac{3}{4}$. Among the undertakings of the remoter world, Cape Town changed hands at 4, Monte Video at 13$\frac{1}{8}$ (a rise of $\frac{1}{4}$), Ottoman at 7 and 7$\frac{1}{16}$ (a rise of $\frac{1}{4}$), Primitiva at from 7$\frac{13}{16}$ to 7$\frac{15}{16}$ (a rise of $\frac{1}{16}$), and ditto preference at from 5$\frac{1}{4}$ to 5$\frac{11}{32}$.

ELECTRICITY SUPPLY MEMORANDA.

Points Judiciously Avoided—Difficulty of Pleasing all People—Memorabilia—Five Candles per Cubic Foot!—All Life-Giving Oxygen Exhausted from Rooms by the Use of Gas—Olympian Suggestions.

Before the decision of last Wednesday, reported upon elsewhere, all the electrical papers had their turn at the subject of the Holborn public-lighting contract; and, with one accord, they avoided some of the principal aspects of the matter. It was a "triumph of electricity;" "it was a complete answer to all the carefully inflated statements about London going back to gas;" "the issue was extremely interesting," inasmuch as "both competitors are private companies;" and it was many other things. The Gower Street experiment proved the superiority of electricity as a lighting agent. Just so. It is so easy to get more work out of a 400-horse power engine than out of a 300-horse power one; and it should be equally as easy to get more light out of a 400-candle power (actual) electric lamp than out of a 300-candle power gas-lamp, though the diffusion of the light of the former may not be any better than that of the latter. It is also easy for a competitor, when the bulk of the figures of his rival is known, to cut down his own tender to below those figures. One of the principal electrical tenderers for the Holborn lighting was beaten by the Gaslight Company in open competition in the neighbouring borough of Paddington. There was good cause for preventing a further lowering of that Electric Supply Company's crest. It is further noteworthy that the tenders were not calculated out upon the results of the Gower Street experiments, but upon the total illumination required, which the Borough Council propose to see that, under any new contract they may enter into, they get by photometrical test. These are all points that are judiciously avoided in the electrical comments on the reference back of the Works and General Purposes Committee's recommendation that, notwithstanding that the Gaslight and Coke Company's tender was a few hundred pounds higher than that of the three sorely pressed Electric Light Companies who tendered jointly, all things considered, the gas tender was the one to be accepted. The discretion in these matters of our electrical contemporaries is admirable. But last Wednesday's decision leaves the lighting for the

present in the hands of the Gas Company; the ultimate scheme being still an open matter. One other omission of our friends while on the subject. An electrical paper (which usually takes things very gravely when not out on the war-path) boasts of thousands of gas-lamps in London going over to electric lighting "within the last year or two." The paper in question is strongly anti-municipal when dealing with trading. But it seems to find it as easy to change its coat when dealing with public lighting, as the widely admired Right Hon. John Burns does his favourite blue lounge coat for his richly-embroidered Court one. In this instance, our contemporary discreetly omits to herald it forth that the changes that have been made from gas to electric lighting in the Metropolitan area have been due to municipal ownership of the electricity undertakings, and only in those districts in which there is such municipal ownership has there been any change-over "the last year or two."

The shrieks of the London Electric Supply Companies over their repeated defeats in connection with the public lighting contracts are so loud that they frequently reach the daily papers. They protest over this and over that; nothing in the conditions of tendering is in their favour; and things ought to be arranged so that they will particularly favour them. There is also an occasional fancy shown for amending tenders, or making new propositions after the tenders have been opened and the figures have been made public. Something of the sort was claimed in the case of Paddington. This ought not to be allowed, unless some good ground can be shown for it, or unless common justice demands it. The Chelsea Electricity Supply Company are the latest to complain of not being allowed to tender on equal terms with the Gaslight and Coke Company for the Borough of Chelsea lighting; and the "Pall Mall Gazette" has circulated in its columns the Company's protest. The Company state that they ask for no preference, but only equality—next time the contract is up for settlement. As the Gaslight and Coke Company's new contract will run for seven years, the question of a further contract will not require to be considered yet awhile. The Electric Light Company's request is quite fair; but, regarding the contract just entered into with the Gas Company, it does not do to be lavish with sympathy on *ex parte* statements. The facts have not all been made public. Were they made public, a new complexion might be put on the electrical protest. Perhaps there is much underlying one of the Company's points: "Neither party should be given the advantage of prematurely terminating a contract already entered into at a higher price." That is rather a strong proposition, if a local authority find there is economy and better value in the matter of efficiency in terminating a contract at a higher price, and entering into one with the same people at a lower price. The Gas Company are putting into the streets of Chelsea inverted gas-burners, a larger illuminating power is being obtained, and the Council (who were not influenced by a tender submitted by the Electricity Company after the Gas Company's proposal had been made) found the interests of the ratepayers were being served in accepting the scheme; and among the contracts of the Gas Company reposes a septennial one for Chelsea. Yet these electrical ratepayers are not satisfied with the excellent bargain made by the Council. It is hard to please some people.

It has been frequently remarked by us that the "Manchester Guardian" deals very fairly with questions affecting illumination. That is not always the case with the ordinary newspaper. In local papers partizanship in this connection often takes the political path. If the majority dominating (say) a municipal electricity committee hold the same political views as a paper, then that paper may be relied upon to see eye to eye with that committee in all their doings, and to support their commodity—in print—through thick and thin. The "Manchester Guardian" has just published an article on "Artificial Lighting;" and the article has for its basis the paper that Professor Marchant recently read before the Liverpool Engineering Society. An epitome of the communication was published in the "JOURNAL" at the time (*ante*, p. 301); but there are one or two points that may be accentuated by reference here, as they are worth placing among one's *memorabilia*. It was stated by the Professor as an advantage of the incandescent gas mantle over the electric incandescent lamp that it gives a more uniform illumination for desk work, provided it is of the inverted type. This being so, it follows that the inverted gas-lamp must be of superior utility to the electric lamp for a good many purposes other than desk lighting—omitting altogether all consideration of the question of the relative costs. Using a shade and frosting the lower half of the bulb, the electric lamp is greatly improved; but still Professor Marchant is of opinion that much remains to be done before, for desk lighting, such lamps can be considered good illuminants. This question of eye protection by frosting, has a bearing upon costs based on consumption in relation to efficiency. It is also suggested that the unequal distribution of the light by the electric incandescent lamp can be modified by the adoption of low candle power electric lamp units. But this adds to first and maintenance costs. Again, by raising the lamp well above the surface to be illuminated, an improvement is effected. But there are limits to this. The step is short from these considerations to the question of intrinsic brilliancy, which the electrical industry is finding so troublesome to-day, excepting where expense is no object. The metallic filament lamp gave the electricity industry on the one hand economy, but on the other it insisted on discounting it by demanding the application of globes and eye-shielding devices in defence of the vision of those who employ the lamp. We well remember being once taken to task for making this point by someone who professed and reckoned himself to be an electrical authority. His assertion was that the use of a prismatic or such-like globe round a metallic filament lamp actually increased the amount of light given by the latter. No external application of the kind can increase the light emitted by the source itself; all that it does is to break down the hurtful intrinsic brilliancy, or to direct the light where it may be wanted. It is well to bear in mind Dr. Stockhausen's figures as to intrinsic brilliancy to see what a tremendous drawback the naked metallic filament lamp is to the electrical industry. These figures have come to be regarded as standard ones among most students of illumination. The intrinsic brilliancy of the incandescent mantle is only 5·2, of the carbon filament lamp 70, of the metallic filament lamp 170, and of the arc crater 2600. Clearly, therefore, as our Manchester contemporary puts it, no electric lamp ought to be directly exposed within the usual line of vision. By means of shades, inverted reflectors, and ceiling reflection, the light should be thrown down while its source is hidden. But this is uneconomical, and beyond the means of the great mass of the people.

We think we trace, but are not sure, the hand of the Electricity Publicity Committee, in a three-column advertisement that has appeared in the "Manchester Courier." The well-thumbed quotations from the factory report for 1909, and from the "Lancet" (which have no possible connection with the use of gas for domestic purposes) are used again. These are a prominent feature of the literature of the Electricity Publicity Committee. Anyway they keep the quotations in stock, and make large use of them. But whoever may be the author of the three-column article in the Manchester paper, there is very little doubt that conscience does not trouble him much, or he would refrain from the falsehood which is contained in one of the calculations put forward. He reckons that to run ten 16-candle Osram lamps for 365 days at four hours per day (including £1 7s. 6d. the initial outlay on the lamps) would cost £5 4s. 3d.; while ten incandescent gas-burners, each consuming 3 cubic feet of gas per hour for four hours per day, and for the 365 days, at 2s. 3d. per 1000 cubic feet (*plus* renewals of four mantles per burner per year at 4½d. each) would amount to £5 13s. 9d. Then follows the deliberate falsehood. It is said: "It is clear that we can now have four hours' illumination every day of the year from ten 16-candle power metal filament lamps for very considerably less than the cost of maintaining ten incandescent gas-burners, *which give a doubtful illumination of 15-candle power*." How any man can credit himself with the authorship of this statement, and still wish to be classed as truthful passes understanding. Three cubic feet and 15-candle power is only equal to an efficiency of 5 candles per cubic foot of gas consumed—only a shade better than the efficiency of the antiquated flat-flame burner! With 3 cubic feet of gas, according to its quality, from 60 to 75 candles can be easily obtained with an ordinary inverted burner. Ten plain metallic filament lamps, each the equivalent of this power, in use for four hours per day through the year, would necessitate the consumption of 1095 units (1·25 watts per candle power), costing at 3¾d., £17 2s. 2d. Adding to this (say) 4s. per lamp, or £2 for ten, we have a total of £19 2s. 2d. for electricity, as compared with £5 13s. 9d. mentioned in the advertisement for gas. We cannot go through the whole of this misleading advertisement; it must be dealt with another way. But one more quotation will show a cause for the rapid depopulation of the world. "To produce a flame," we are told, "it must be mixed with air; and the result of this combination is that a gas-jet burning in a room will quickly consume *all the life-giving oxygen*." Some members of the Electricity Publicity Committee and the subscribers to their funds, or, if they are not responsible for this particular advertisement, those who are, were no doubt last Sunday confessing that they are "miserable sinners." In that they were not wrong; and it is a satisfaction to know that truth with them sometimes prevails.

The electrical industry has made a very bad choice of year for their exhibition at Olympia. The people of London and of the Provinces are going to be surfeited with entertainment and attractions in this the Coronation Year; and those who are tempted to London for the great event, and to view the big exhibitions—the Empire of Festival Exhibition and the Coronation Exhibition—will, before the Electrical Exhibition at Olympia opens towards the end of September, have shaken the dust of the Metropolis from off their feet, and will probably refuse to come back again this year, however stupendous the show that the electrical industry plants at Olympia. A meeting of the Advisory Committee has been held to consider suggestions for making the exhibition a success. The suggestions did not show that there was much inventive genius present on the occasion. There was one novel idea put forward, which was listened to with profound respect. Our readers must please take it seriously, and not think it a matter that merits laughter. It was that, if possible, the caterers be arranged with to supply tea in a separate room, in which visitors should be allowed to make their own toast, &c., all the operations being done electrically! How nice! Visitors do not as a rule go out sight-seeing, and spend a large part of the time making their own tea and toast, and with strangers looking on! They generally prefer that other people should do this. Some of the visitors could no doubt be induced to do it on condition that Messrs. Lyons and Co. paid them fairly for their trouble. Then it was suggested that an endeavour should be made to get the caterers to do the cooking at the show electrically, and to obtain the necessary apparatus from the exhibitors. The Chairman (Mr. E. Cunliffe-Owen) fears that there will be very great difficulty in

doing this. We share his fears; and Messrs. Lyons and Co.'s fears will crush his and ours beneath their weight. Whoever heard of Messrs. Lyons and Co. consenting to playing ducks and drakes with their reputation in this way? The "Electrician" hopes the electricity supply authorities in London will point out "the essential differences between electricity and gas." We hope they will——truthfully. We rather fancy that the "Electrical Review" is shaking over the question of success. "If," it says, "we can only get the people to come and see, and, having seen, depart so impressed that all gas and other fictions shall not cause them to forget or to be misled again," and so on. That is exceedingly unkind and uncharitable. It is nearly as hurtful as the last ditch in which our friends pictured the gas industry writhing in its death agonies.

"STEREO-PYROMETER"—A HAND INSTRUMENT.

In the primary process of gas manufacture, much depends upon temperatures to ensure success; and a ready means of ascertaining approximately whether the temperatures are being maintained at the point required is certainly a desideratum, from the two points of view of efficient working and eye protection. Lately we have had an appliance introduced to our notice for testing surface brightness, by means of an optical hand instrument; and now we have one claiming attention by means of which temperatures may be quickly gauged, without the employment of any delicate mechanism. The makers are Messrs. W. & J. George, Limited, of Birmingham.

We have not had an opportunity of trying the new patent instrument. But it is cheap; and therefore it will not be a serious matter for readers to give it trial. There is no doubt about its simplicity; its use is readily learned; it is employed like a stereoscope for direct observation only; being used at some distance from the object under examination, there is no deterioration caused by the heat; it can be carried about without any more labour than is imposed by a pair of field glasses; and its temperature range runs from 550° C. to 2000° C., so that for gas-works purposes, it comprehends all that is necessary.

From the information supplied by the makers, it is gathered that the "Stereo-Pyrometer" consists essentially of small glass cells containing dyes, the absorptive powers of which are so chosen that all the light of whatever colour emitted by a hot body is absorbed. If the temperature of the body were raised, that cell would not absorb all the light; some would be transmitted, and the body would appear visible. It is explained that, as the intensity of the light and the range of wave-lengths emitted by any one body is a function of its temperature, it follows that cells can be constructed, each corresponding to a definite temperature. A considerable number of dyes of all concentrations have been examined spectroscopically to test their specific absorption. In combining these, it was discovered that the eye was more sensitive for the change from darkness to a certain wave-length in the dark red, than from darkness to a combination of all the wave-lengths emitted. When the luminosity of a coloured object is very much reduced, a point arrives at which it no longer appears coloured although still visible—usually, a pale, greyish phosphorescent colour. This is supposed to be due to the fact that the rods of the retina are not sensitive to colour, though giving the impression of light; the colour appearing as soon as the intensity is sufficient to stimulate the cones of the retina.

With regard to the advantages of the new instrument, several are claimed. Among them are these: It enables both eyes to be used. For reliable observations, the simultaneous use of both eyes is most desirable, and in some cases essential. The "Stereo-Pyrometer" is a zero, and not a comparison, instrument. The point observed is when the object just disappears from view. The whole of the instrument is used right away from the hot body, so that no part of it suffers from the chemical changes, disintegration, and depreciation which all bodies experience at high temperature. It can be used at any convenient distance from the hot object, so long as the intervening space is comparatively free from smoke, &c. The area of the object in question diminishes according to the square of the distance; the illumination at the pyrometer due to the hot object also varies inversely to the same extent.

The instrument cannot be used unless the hot body is visible either directly or by reflection. It gives readings that are slightly too low if thick layers of carbon monoxide, carbon dioxide, or water vapour are interposed; and if dense fumes are interposed, the readings will be distinctly low. When it is desired to maintain one steady temperature, the makers recommend the employment of the form containing two pairs of cells—one for a temperature slightly higher than the other; and the articles or furnace will be at the correct temperature when the observation port is visible through the lower, and invisible through the higher cell. A workman prefers to rely on his own eyes for gauging the temperature, but is not averse to shielding them from the glare of the furnace. The pyrometer, of course, eliminates all errors due to the idea of "a cherry red," varying from day to day, and to the variation in the light incident on the observer's eyes.

Many more points are suggested and explained by the makers; but we have said sufficient to show that here, under the greater scientific control of operations that now prevails in gas-works, there is an instrument whose claims to usefulness merit trial.

PERSONAL.

By the will of Lord Winterstoke, Mr. A. J. Alexander, the Secretary of the Bristol Water-Works Company, comes into a legacy of £1000.

Last Saturday Alderman Gibson, Chairman of the Manchester Corporation Gas Committee, celebrated his 80th birthday—having been born in 1832.

Mr. Frederick A. Gulland, the principal assistant in the accountants' office of the Manchester Corporation Gas Department, has, out of a number of applicants, secured the appointment of head clerk and cashier to the Maidstone Gas Company.

It will probably be remembered that, at the recent meeting of the Croydon Gas Company, reference was made by Mr. Corbet Woodall to the absence of the Engineer and General Manager, Mr. James W. Helps. As mentioned by the Chairman at a later stage of the proceedings, Mr. Helps had not been in good health, and the Board had enabled him to go away for a rest and change; and they trusted he would return restored, and resume his duties with his accustomed activity. His many friends will, we are sure, be pleased to learn that he is making very satisfactory progress.

OBITUARY.

Mr. R. Readdie, Manager of the Leven (Fife) Gas Company, Limited, for thirty years, died at Leven on Sunday, the 19th inst., in his 83rd year. Mr. Readdie retired in 1900; and his son, Mr. P. Readdie, succeeded him.

Provost Smith, of Dunbar, who had been Convener of the Corporation Gas Committee for many years, died at Dunbar on Sunday, the 19th inst., after a few hours' illness. He had been for 35 years a member of the Town Council. Of late years he was frequent in his attendances at the meetings of the Waverley Association of Gas Managers.

The "Journal für Gasbeleuchtung" reports that the death occurred on the 8th inst. of Herr Otto Benninghoff, the Chief Engineer of the firm of August Klönne, of Dortmund, in whose service he had been for over thirty years. His name will be familiar to readers of the "Journal" from his having taken an active part in recent discussions on the merits of different types of carbonizing chambers and vertical retorts.

It may be remembered that in the article on the annual dinner of the Junior Institution of Engineers which appeared in the "Journal" on the 14th inst. (p. 435), it was mentioned that the Chairman, Mr. John Wylie Nisbet, was unable to be present, owing to ill-health. We regret to learn that his illness terminated fatally on the 17th inst., at the early age of forty-two. Deceased was one of the staff of Messrs. John Aird and Co., and superintended for them the erection of the Nechells Gas-Works at Birmingham, including a holder of 8¼ million cubic feet capacity. He was subsequently appointed Works Manager at their Belvedere Road Depôt. He was a man of great energy and tact, and possessed a kindly disposition which endeared many to him. His loss will consequently be keenly felt in the business and social circles in which he moved. At the meeting of the Institution on the day of his decease, a resolution of regret and sympathy with the widow and family was passed; and, as a mark of respect and regard, the proceedings were at once adjourned.

Masonic—Murdoch Lodge.

Last Thursday the Murdoch Lodge, No. 3480, was consecrated at Birmingham; and a third "Gas Lodge" was thus started under circumstances that augur well for a very prosperous future. The officers duly invested are all well known in the profession, as the following list shows:

W. Bro. C. Meiklejohn, P.M., 502, P.P.G.A.D.C.	W.M.
„ „ W. A. Sapey, P.M., 1060	I.P.M.
„ „ C. E. Bloomer, P.M., 573, P.P.G.S.W.	S.W.
„ „ Chas. Dakin, P.M., 573, P.P.G.D.	J.W.
„ „ Vincent Hughes, P.M., 2582	Chaplain.
„ „ T. Berridge, J.P., P.M., 1085, P.P.G.D.	Treasurer.
„ „ Adam Cooke, P.M., 2385, P.P.G.D.C.	Secretary.
„ „ E. L. Adlington, P.M., 280, P.P.G.A.Sec.	S.D.
Bro. Sidney O. Stephenson	J.D.
W. Bro. A. T. Harris, P.M., 1330	D.C.
„ „ Fred Vale, P.M., 560, P.P.G.A.Sec.	Assistant D.C.
„ „ Thomas Cash, P.M., 1719	Charity Steward.
Bro. A. C. Scrivener	Organist
„ Harold G. Eveson	Assistant Secretary.
„ S. P. Thornton	I.G.
„ W. J. R. Baker	Stewards.
„ Robert Scott	Stewards.

There were in all twenty-five founders—the seventeen brethren mentioned above and the following: Bros. Frank Jervis, Alfred Bird, Alfred Withers, Albert E. Parker, Fred. Lee, Charles H. Webb, Luke B. Taylor, and Henry J. Woodfine. After the ceremony, which was impressively rendered by the Marquis of Hertford, Provincial Grand Master of Warwickshire, assisted by a number of Provincial Grand Officers, the visitors adjourned from the Grand Hotel (where the proceedings had so far taken place) to the Imperial Hotel, where W. Bro. Meiklejohn presided at a banquet, at which he was supported by some 120 members of the new Lodge and visitors from far and near.

GAS LIGHTING FOR RAILWAY CARRIAGES.

The Cheapest and Best Illuminant.

[COMMUNICATED.]

So much attention has been drawn to the question of railway carriage lighting by various recent happenings, and so many ridiculous misstatements have appeared in the daily press—many evidently engineered by interested parties—that it seems desirable that a short account should be given of the whole question as it stands at present by one whose duty it has been for some time to supervise these matters on one of our large railways.

To the majority of gas engineers, strangely enough, the question of train-lighting is a sealed book. Why it should be so is a mystery, unless they may have thought the matter outside their province, which it certainly is not. The fact remains that for many years past railway companies have been dealing with a commodity—high-pressure gas—with which gas engineers are only now beginning to bestir themselves.

It is unnecessary to give a history of train lighting. Suffice it to say that it was only about the year 1880 that Julius Pintsch perfected his system of train-lighting by means of oil gas, and made it capable of universal and satisfactory adoption. It is this system which is in general use to-day with one or two trifling modifications and additions—such, for instance, as the incandescent burner.

The requirements of railway carriage lighting are that each vehicle shall be illuminated as a separate unit, and that there shall be sufficient storage to light each coach for 48 hours without replenishing the supply. To store sufficient for this period, therefore, necessitates that the gas shall be compressed. Modern practice is to do this at the works, and lead the gas through pipes to such places in the vicinity as are convenient points for its transfer to the cylinders beneath the coaches. This is done at carriage-sheds or terminal stations where the carriages lie long enough for the operation to be performed without any difficulty. The gas is generally compressed to 150 lbs. per square inch; and as the reservoirs on each coach are fitted with a small gauge, it is easy to judge when a fresh supply is needed.

When Pintsch first introduced his system, coal gas was commonly of from 25 to 30 candle power. Compression, however, had a very serious effect upon it, by depriving it of so much hydrocarbon that if so used it would have resulted in the flat-flame burners which were then in general use giving next to no light. To overcome this difficulty, it was found necessary to take a much richer gas, which would not be so seriously affected by compression; and it was by improvements in the manufacture of oil gas and by placing a simple and reliable method of manufacturing it on the market, that train-lighting this way was possible. It is true that oil gas itself loses lighting power, as given in flat-flame burners, but not so greatly as coal gas; for while the former may drop from 50 candle power to 40 candle power, the latter probably drops from 25 candles to (say) 10 candles, in which case it could only be used for heating purposes.

Originally it was the general practice to burn the gas at a pressure of 2 inches—the reduction being obtained by the interposition of a governor at the outlet of the storage cylinder. Flat-flame burners using 1 cubic foot per hour (and consequently giving about 8 candle power each) were standardized with; any number from one to four being used in each compartment. The supply of gas in the storage cylinder was replenished from time to time, as soon as the pressure-gauge showed the necessity, by means of flexible connections from the high-pressure mains. By this means a very satisfactory light indeed was obtained. Some companies, as a matter of fact, went to the trouble of adding a small percentage of acetylene to the oil gas, which increased its illuminating power. But this was not done in many instances.

The greatest factor in gas lighting in recent years has been the introduction of the incandescent burner. For many years, no one thought of applying this to carriage lighting, owing to the fragile mantle; but at last some adventurous soul in France made the experiment of fitting a small upright burner. Contrary to expectation, the mantle stood well; and as a result a large proportion of French railway carriages are now so fitted. In this country, although the upright incandescent burner was given a trial, it did not afford satisfaction; and in view of the almost immediate introduction of the inverted burner, nothing further was done with it. The last-mentioned burner, however, proved an immediate success; for it used less gas, and gave more light, and altogether it required very little more attention than the old flat-flame type.

With the new inverted incandescent burners it has been found desirable to increase the gas pressure at the nipple from 2 inches to from 8 to 20 inches (practice differs on the various railways). With this, and a consumption of 0·5 cubic foot of oil gas per hour a light of 25-candle power will be given; for 0·6 cubic foot, 30 candle power; and for 1 cubic foot, 50-candle power. To railway companies who were burning many million cubic feet of gas in the course of the year, at a cost of from 10s. to 12s. per 1000, the new burners proved a veritable boon, and the lighting bill is now cut down by at least half. In many carriages the new burners, using 0·6 cubic foot of gas per hour, replace two flat-flame burners using 2 cubic feet per hour; while at the same time the light is vastly improved. It should be mentioned that 30 candle power is the light that railway men now generally standardize with.

The principal difficulty met with in the use of the new lights was in the lighting, which was done in many cases hastily by rough porters, with the result that mantles were broken. This trouble was overcome by providing bye-passes which consume each the almost incredibly small quantity of 0·025 cubic foot of gas per hour. Through the medium of the bye-passes, and by means of a tap at the end of each carriage, the lights can all be instantly lighted or extinguished. The mantles on main-line trains where there is little violent movement last, on an average, for two months each; while those on local and suburban services require renewing about once every five weeks.

It has been previously explained that the reason why oil gas was taken for carriage lighting purposes at the start was because coal gas when compressed lost its lighting qualities for use in flat-flame burners. When, however, incandescent lighting came to be used, this disadvantage vanished; for only heating qualities were required in the gas, and these coal gas only loses to a very small extent by compression. Of course, oil gas is decidedly richer in quality, and has a greater calorific value, than coal gas; and it is found, in practice, that nearly double the quantity of the last mentioned is required as compared with oil gas to give a similar light. But the difference in price—coal gas (say) 2s. 6d., oil gas (say) 12s. per 1000 cubic feet—allows of a large saving to be made even although more coal gas be used.

The introduction of incandescent lighting being comparatively recent, few of the companies have yet fully appreciated the advantages of using coal gas; and besides this interested parties have been inclined to put difficulties in the way of its adoption, as, of course, is usually the case with every improvement introduced. Our neighbours in France, however—the State Railway, late Ouest—use nothing else; and the Nord, who have been experimenting, announce their intention of following suit. In this country, the Isle of Wight and North London Railways use nothing but coal gas; and various other larger companies are giving it a trial, among others the London, Brighton, and South Coast, the London and North-Western, the North British, and the Caledonian Railways. The principal objection would appear to be the necessity for scrapping the present oil-gas works, of which each railway has several; but there can be little doubt that this is one of the coming changes, and one which is going to reduce the cost of carriage lighting very appreciably.

Incandescent gas is the last word in railway carriage lighting. Even using the costly oil gas, it is very much cheaper than electric light both to instal (gas, £40; electricity, £120 per coach approximately) and afterwards to run, unless burning almost continuously. When coal gas is used, the cost will, of course, be still further lowered—probably by 20 to 30 per cent. The only advantage possessed by electricity is the facility of being able to turn the light on and off along a whole train from the guard's van. This is not really required on many routes; but where trains make long non-stop runs, and pass through several tunnels *en route*, it is certainly a facility which is appreciated, It is true that all the gas lights in an individual carriage comprising anything up to eleven compartments can be turned on and off at once. But this is not enough. Consequently, experiments are now being carried out by certain railways with various mechanical and electrical devices, in order to effect the desired end. There can be no doubt whatever that, in a year or two, gas will be level with electricity in this respect.

In conclusion, in view of the numerous erroneous stories circulated subsequent to the recent lamented railway disaster at Hawes, it seems desirable to add a word regarding the safety of gas lighting for railway carriages. There is an old proverb which says: "The proof of the pudding is in the eating." Applying this principle, one may say that those people who profess to regard gas lighting as dangerous must give a number of instances where it has either caused a disaster or augmented one. This the writer firmly believes cannot be done. Mr. Hughes, now the Chief Mechanical Engineer of the Lancashire and Yorkshire Railway, in the discussion on a paper read before the Institution of Mechanical Engineers on Jan. 18, 1907, said: "He had examined the records of all accidents to passenger trains which had been reported upon by the Board of Trade during the last 26 years. The result was that, out of 1478 accidents there had been 14 cases in which the wreckage had been involved in fire. An examination of these 14 cases showed that in one instance the fire was due to a defective motor; in one instance it was due to a lighted reading lamp; in three instances it could not possibly be allocated; in four cases it was due to gas; and in five to the fuel from the locomotive—or, briefly, a percentage of ·027 on the total number of accidents." This is convincing testimony; but what is even more to the point, the Lancashire and Yorkshire, as well as numerous other railways, are acting up to it, and fitting nothing but gas lighting in all their new carriages.

Certain persons would like to give the mishaps at Grantham and Hawes as instances where the conflagration was caused by the gas; but the writer has every reason to believe, from the statements of witnesses, that this was not the case; the fire in each instance starting from the engine. It is true that in the event of a train-wreck catching fire from any cause, it would probably burn more fiercely around the gas cylinders—if any gas remained in them after the smash, which is certainly very doubtful; but this is quite a different matter from laying the blame (as some do) on gas of being the cause.

RATING OF GAS AND WATER UNDERTAKINGS,

WITH AN OUTLINE OF GENERAL PROCEDURE OUTSIDE THE METROPOLIS.

By Arthur Valon, Assoc.M.Inst.C.E.

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II.

Gas Undertakings.

Receipts.

Gas-Rental.—The receipts of a gas undertaking are principally derived from the sale of gas, and are usually stated in the accounts under two heads—private lighting and public lighting—although the private lighting is very frequently divided into gas sold to ordinary consumers and gas sold through prepayment meters. It is not always possible to take the receipts as stated as the amount which a tenant might reasonably be expected to obtain, because the price of gas may have been altered during the period covered by the accounts, or it may be intended to reduce or increase the price in the immediate future. In either of these cases, a proper adjustment should be made.

If the price has been altered during the period covered by the accounts, and no further alteration is anticipated, the actual receipts will be greater or less than they would have been had the price charged at the time of the valuation prevailed during the whole period; and this would be taken into consideration by a prospective tenant. Similarly, if gas in the immediate future is to be supplied at an altered price, this would affect the amount of the receipts which could be expected, and, consequently, an adjustment must be made in the estimate.

Prepayment Receipts.—The prepayment clauses usually inserted in Acts of Parliament relating to gas undertakings authorize an extra charge per 1000 cubic feet of gas sold, beyond the price to ordinary consumers, to cover the cost of letting, fixing, repairing, and maintenance of the meters, stoves, and fittings, and the cost of collection and any other costs which may be incurred by the company in connection with the meter and fittings. Undertakings differ greatly in their methods of accounting for these receipts. It is assumed, following the directions of the Act, that the price of gas supplied through prepayment meters is the same as that through ordinary meters, and therefore the amount placed under the head of gas supplied to prepayment consumers is equal to the total quantity of gas supplied on this system, multiplied by the rate per 1000 cubic feet at which the gas is supplied to ordinary consumers.

The extra charge authorized by the Act is usually divided under different heads, according to the purposes for which it is sanctioned—*i.e.*, rental of meters, stoves, and fittings. The amount received from the extra charge does not, however, always appear in the revenue account, as the whole, or part, is sometimes carried to a suspense account for the purpose of replacing the outlay incurred to provide the pipes and fittings in the houses supplied under the prepayment system. These methods, and others, may be quite legitimate as far as concerns the accounts of the undertaking; but for the purposes of valuation, all revenue must be credited to the receipts, and any expenses incurred included in the expenditure.

Meter, &c., Rental.—The meter, stove, and fittings rental will also be included in the receipts, and generally no alteration of the figures will be required, as the basis of charge for these is seldom changed.

Residuals Receipts.—The receipts from residuals are not invariably placed on the receipts side in making a valuation, but are sometimes deducted from the gross cost of the coal. This is a needless complication, but makes no difference to the result provided that, in calculating the tenant's capital, regard is had to the fact that the residuals receipts are not entirely cash.

Rents Receivable.—The property for which rents are received is usually rated separately; and in that case the amount must not be included in the receipts, as this would result in the property being rated twice over.

Transfer Fees.—These should be excluded.

Miscellaneous Receipts.—There are occasionally other items included among the receipts; and if these would increase the profit which the tenant could reasonably expect to make as the result of his tenancy, they should be included in the valuation.

Bad Debts.—In the accounts these will be found among the expenses, but should be treated as a deduction from the receipts, so that the calculation of the amount required for working capital should not be affected.

Expenditure.

Coal and Oil, including all Expenses thereon.—The cost of these materials will vary from time to time; and as the rent which is to be fixed is the rent for the future and not for the past, it is necessary to estimate the effect of any material variation in cost which can be reasonably foreseen at the time when the valuation is made. For instance, should the price of coal have altered during the account year, and such altered price be likely to continue during the ensuing year, the expenditure for coal, which will have to be met by the tenant, will be different from that which is shown in the actual accounts under consideration; and such difference must be estimated and due allowance made for it. If the market is in an unstable condition, the actual expenditure to be met may be difficult to determine; but the matter must be looked at from the point of view of a prudent business man, and such allowance made as knowledge and experience would reasonably justify. At the same time, allowance must be made for any set-off on the other side, in the shape of an increase in the price of residuals.

Where an appeal has been made from the decision of the assessment committee, it would seem that alterations in price which could not have been foreseen at the time when the decision was made cannot be taken into consideration; but when an increase or decrease of price has been prognosticated, and has actually taken place after the decision of the committee but before the hearing of the appeal, the fact might be used to justify a reduction which had been asked for on these grounds.

Purification, Wages at Works, &c.—The expenditure upon purification, salaries of engineers and other officers at works, wages and gratuities at works, and wages of officers and rental clerks, is usually assumed to be wholly incurred by the tenant in carrying on the undertaking; but in some cases a proportion of the salaries is deducted on the ground that the officials are partly employed in the extension of the hereditament, which is a charge falling on the hypothetical landlord.

Repair and Maintenance.—The Parochial Assessments Act, 1836, lays down that the rent which governs the rateable value is to be the rent which would be paid by a tenant from year to year, and provides that the average annual cost of maintaining the hereditament shall be deducted from the gross rent, thus following the usual practice, which is for the repairs to be done by the landlord when property is held upon a yearly tenancy. This cost of maintenance, being a charge which falls upon the landlord, will not enter into the expenditure now under consideration, which is the expenditure to be met by the tenant, but will be dealt with later in connection with the expenses allowed by Statute to the landlord. There are, however, other expenses of repair and maintenance, besides that incurred for the upkeep of the landlord's property, which have to be met in carrying on the business of gas supply; and these expenses will form part of the expenditure to be met by the tenant.

Although the expenditure on repair and maintenance is placed in the accounts under several different heads, the division does not exactly correspond to the division it is necessary to make between landlord and tenant. Such items as the repair and renewal of meters and stoves, and of prepayment fittings, will be, as these are tenant's chattels, wholly attributable to the tenant. But under the heads of repair and maintenance of works and plant, and repair and renewal of mains and service pipes, there is included, in addition to maintenance costs attributable to the landlord, some repairs to chattels and certain miscellaneous expenses on such things as cleaning up the yard, and cleaning out mains on works, which would fall upon the tenant in the ordinary course of the working of the business.

If the details of the items are obtainable, the various expenses can be correctly divided between landlord and tenant; but the trouble usually involved in such an investigation has made it customary to divide the amount in some arbitrary proportion. Great diversity of opinion often occurs as to the correct proportion that should be allowed, and the tenant's expenditure has been variously estimated at one-sixth up to as much as two-thirds of the whole. Each case, of course, will require to be decided in accordance with the circumstances; and although an average figure may be found to accord with general experience of works somewhat similarly situated, it is desirable to use great caution in applying such a figure to works where the conditions, or the method of allocating costs in the accounts, may be different.

It has sometimes been contended that the conditions under which a gas undertaking must be carried on make it impossible for the repairs to the hereditament to be done by anyone other than the tenant, and that an arrangement would have to be made between the landlord and tenant to that end; and that as the tenant would have to provide the working capital to meet the consequent cost, he would expect the same return as for any other capital which he finds. Those who have put forward this view have, therefore, included the whole expense of maintenance in the tenant's expenditure, so that the tenant's capital will be increased by this amount; the effect on the valuation being to reduce the rateable value by the amount of the tenant's allowances in respect of the additional capital.

There are two points involved in this contention—one of which is a matter of fact while the other is a matter of form. The fact it is sought to prove is that the expenditure on the maintenance of the hereditament shown in the accounts is less than it would be were the property let on the terms laid down in the Act; and this, if true, would, of course, require that the landlord's statutable allowances should be increased. But it must be incorrect in form, even if identical in result, to put expenditure as tenant's which the Act expressly directs shall be attributed to the landlord. As regards the point of fact, it may be suggested that it does not at all follow that because an arrangement is made for the convenience of both parties that the tenant should act as the agent of the landlord for the repair of the hereditament, that the landlord would not provide the cost of the repairs as and when they became necessary; thus preventing any call upon the tenant's capital.

Repair of Tenant's Chattels.—The cost of maintaining the chattels, which are not part of the property let by the landlord but are provided by the tenant, must be included as an item of expenditure. These chattels comprise meters, stoves, prepayment

pipes and fittings, any loose tools and implements, railway trucks, carts, and any machine tools, &c., not so fixed as to form part of the hereditament, tugs and barges, and so on. It was decided in the Lee case [*Regina v. Lee*, L.R., 1 Q.B., 241; 35 L.J. (M.C.) 105] that meters were tenant's chattels, but that retorts, purifiers, boilers, steam-engines, holders, pumps, and exhausters were part of the rateable hereditament. [See Appendix B.]

Since the date of this decision, it has become the general practice of gas companies to let on hire gas-stoves for heating and cooking; and in order to extend the use of gas in small houses, it has also become the custom for companies to provide the necessary pipes and fittings and to supply gas through a meter fitted with a mechanical device by which, on the insertion of a coin in a slot, a definite quantity of gas is allowed to pass, after which the supply is automatically cut off unless another coin has been inserted. The cost of the upkeep of these installations, together with the interest on the outlay, and any other expenses, is covered by an extra charge per 1000 cubic feet of gas above that charged to ordinary consumers.

For some years it was usual to treat the stoves and prepayment fittings as tenant's chattels, although it had often been questioned by the rating authorities as to whether this was the proper method of dealing with them. The matter had, however, not been raised in a sufficiently definite manner for a decision to be given upon it, until the appeal of the Ipswich Gas Company, in 1907, against the assessment of their undertaking. Upon the decision of the Recorder, a special case was stated and argued in the King's Bench Division of the High Court of Justice, before Justices Channell, Bray, and Sutton. After hearing arguments for the Assessment Committee, their Lordships, without calling upon the Counsel for the Company, decided that this apparatus was to be taken as being provided by the tenant. The decision will be found set forth at length in Appendix C.

Repair and Renewal of Meters and Stoves.—As a general rule, it is sufficiently accurate to take the cost of repair and renewal of meters and stoves as stated in the accounts; but should the actual figures for any reason be abnormal, a proper adjustment must be made. It is assumed that the meters and stoves are kept in good working condition by carrying out from time to time whatever repairs and renewals may become necessary; and in the case of an undertaking which is expanding at a fairly regular rate, the expenditure on upkeep should not vary greatly from year to year. If, however, much variation occurs, it may be desirable to average the expenditure over a series of years. Many companies, in effect, do this by allowing a certain depreciation upon the net capital cost, calculated according to the estimated amount that should need to be spent upon upkeep, including replacement at the end of the effective life of the apparatus. This method disposes of a difficulty which sometimes arises when a large proportion of the meters and stoves are comparatively new, and the cost of upkeep has not, in consequence, reached an average. In such cases, but little repair, and no renewal, may be required for some years, but there is a gradual wearing out; and if the tenancy came to an end, and it were necessary to dispose of the chattels, their value would be diminished by the accumulated liability for repairs. Although the actual expense of repair may not be incurred until a later date, the liability accrues year by year, and should be provided for in the expenditure for each year. Of course, it does not follow that the actual depreciation allowed in the accounts is the proper figure to be included in a valuation, as, for reasons which may be quite legitimate, the initial cost of apparatus may sometimes be written off at a faster rate than that of the average depreciation.

Repair and Maintenance of Slot Pipes and Fittings.—The methods adopted by different gas undertakings for providing in the annual accounts for the cost of the repair and maintenance of pipes and fittings in prepayment consumers' houses, vary greatly. The initial cost of the installations is sometimes either wholly or in part paid for out of the revenue for the year. But when making a valuation for the purpose of rating, it has to be assumed that a tenant would meet the cost out of the capital which he must provide for carrying on the business; and, therefore, whatever proportion of the capital cost has been included in the revenue account must be excluded from the valuation.

It is not unusual to place the capital cost to a suspense account, and, as was explained when treating of the receipts, gradually to replace this outlay from revenue by also carrying to the suspense account a proportion of the extra charge made to the consumers under the system. The cost of maintenance is also sometimes dealt with in the same way; and as the receipts so dealt with must be replaced to the revenue account, so likewise the maintenance cost must be added to the expenditure. The actual repair of the pipes is very frequently small; but owing to their being fixed on property not belonging to the undertaking, and to the fact that their value, if removed, would be little or nothing, a heavy depreciation is generally made. The amount to be allowed for this in the valuation will depend on what provision it is considered that a tenant would feel himself bound to make for any loss which might devolve upon him if he had to realize on the termination of his tenancy, or if the pipes ceased to be of value for the supply of gas.

Public Lamps, Lighting and Repairing.—This can generally be taken, as stated in the accounts, but when, as sometimes happens with undertakings owned by public authorities, the public lighting is done at the expense of the gas department, then the cost ought either to be excluded from the valuation, or a sufficient addition made to the receipts for the value of the light supplied. This is an example of a case in which the profit made is not a complete measure of the value of the occupation—other benefits being obtained for which it is necessary to estimate what the increase in rent would be.

Rents, Rates, and Taxes.—District offices, show-rooms, stores, and other premises at a distance from the works are often not owned by the occupiers, and the rent paid appears in the accounts of the undertaking. The premises rented, however, form part of those necessary to the business, and the rents will be included in the rent of the whole undertaking. They must therefore be excluded from the tenant's expenditure. But if, as is probable, the premises are rated separately, it must be remembered that their rateable value will be included in the total rateable value, and must be deducted in order to arrive at the rateable value of the remainder of the undertaking.

Rent paid for cottages used by employees is in the nature of wages, and properly allowable as tenant's expense; but their rateable value will be in addition to that of the undertaking.

The expenditure upon rates is a proper deduction to be made from the receipts; but as the amount of these will depend on the rateable value which has not yet been determined, it is usual to make this deduction at the end of the valuation.

Should income-tax have been placed under this head it must be excluded, as it is not a tenant's expense, but a personal liability to the State in respect of income, and forms part of the rent and the tenant's share respectively.

Directors' Fees, Salaries of Secretary, Accountant, and Clerks.—The whole amount of the fees paid to directors, and the total cost of the general staff, is probably more often than not treated as an expense which would fall upon the tenant. But there are many valuers who make some deduction from the total amount for the time occupied by the directors and officials in dealing with matters connected with the landlord's interest, apart from that of the tenant. Whether or no such a deduction is proper to be made will depend not only upon the fact of the work for the landlord having been done, but also upon the question whether, if this work had not been done, the cost to the tenant would have been less. It is quite possible that the same scale of remuneration would have to be paid although the duties required to be performed were less extensive; while, at the same time, it is not to be doubted there are cases where the extra cost involved by work in connection with the landlord's hereditament should not be ignored.

Collectors, Stationery, and Printing, General Establishment Charges, Auditors' Fees, &c.—Unless these items in the accounts vary much in amount from year to year, it will be sufficiently accurate to adopt the actual figures shown. With small undertakings, the books and stationery sufficient to last several years are generally purchased at one time, and in this and similar cases the expenditure should be averaged so as to give the cost fairly attributable to one year.

Parliamentary and Law Charges.—The cost of promoting an Act of Parliament for the purposes of authorizing the establishment of an undertaking, or for conferring powers necessary for extending or continuing it, is a duty devolving upon the landlord; and the cost will therefore not enter into the tenant's calculations. However, occasionally there are expenses incurred in opposition to a Bill in Parliament which may quite fairly be regarded as likely to fall upon the tenant. Whether any particular item is chargeable to the landlord or to the tenant will be determined by the end for which it was incurred. If to maintain or extend the hereditament —*i.e.*, that which is let to the tenant—it is attributable to the landlord; if, on the other hand, the expenditure is occasioned by some matter arising which affects the business carried on by the tenant, the expense will fall upon the latter. In dealing with charges like these, the occasion for which may only arise at long intervals, it is always necessary to consider to what extent the prospective tenant would feel it requisite to provide against what is often only a remote contingency.

Pensions and Superannuations.—The cost of pensions and superannuation is usually met out of a fund formed partly by payments made by the employer, and partly by deductions from wages, or wholly from one source or the other. The employer's contribution is placed in the revenue account under the head of "Pensions and Superannuations;" and as the prospect of a pension forms part of the remuneration to those employed, the cost of providing the pensions will properly be included in the tenant's expenditure. Pensions and superannuation allowances made as part of the conditions of an amalgamation of two or more undertakings, or as a condition of the sale of one concern to another, or as the result of such amalgamation or purchase, are in a different category altogether. A permanent amalgamation of separate undertakings to form a new whole could only be effected by the owners, and the entire cost of the operation would, as a matter of course, fall upon the landlord.

Leasehold Renewal Fund.—If any of the works are built on land held upon lease, it is usual and proper to make a regular annual payment to a renewal fund in order to replace the capital value of the works at the end of the term of the lease. This sum must be excluded altogether from the valuation, as it is neither a tenant's expense nor a payment necessary to maintain the hereditament in a state to command the rent. The tenure of the land on which the works are built is a matter which affects the landlord alone, and cannot (at any rate in ordinary circumstances) affect in any way the rent which a tenant would pay. That at the end of the term of the lease the works on the land become the property of the owner of the freehold is one of the conditions attaching to

the use of the lands; and the expense which in consequence devolves on the leaseholder is really in the nature of a rent paid at the termination of a lease in respect of the whole term of the lease, and the renewal fund is simply a device to spread the payment over the whole period, so that each year's revenue bears the full rent in respect of that year.

Net Receipts.—A complete examination of the revenue account having been made, the total expenditure which a tenant would need to meet in carrying on the business can be estimated; and, deducting this expenditure from the receipts, the remainder will be the gross profit, or, as it is usually termed, the net receipts. If, as is usual, the expenditure on rates has been excluded from the account, so that it may, as is more convenient, be deducted at the end of the valuation, then the figure obtained will not be the true net receipts, but will include the amount which the tenant must pay for rates.

It will be clear that any rent which a tenant could pay must come out of the net receipts. But before the amount can be determined, it must be settled how much of the net receipts the tenant would expect for his own remuneration; the expectation of making a profit being the only inducement to him to carry on the business. A tenant will naturally desire to obtain for himself as large a share of the profit as possible; but as it is assumed that the undertaking will be let at the highest rent obtainable, and that there will be effective competition for the tenancy, the proportion of the profit which a tenant could expect to secure for his share would be determined by the general rate of remuneration for the class of ability required to carry on successfully the particular type of business, in addition to the market rate of return for the capital employed, having regard to all the risk and loss to which it may be subjected. It is therefore necessary, in order to arrive at the tenant's share, first to determine the amount of capital which must be employed in carrying on the business; and this will now be treated in detail [in a subsequent issue] in a similar manner to that adopted when dealing with the revenue account.

APPENDIX "B."

PHŒNIX GASLIGHT AND COKE COMPANY v. PARISH OF LEE (1866).

Judgment.

COCKBURN, C. J.: Whatever doubt there might be in the case at the commencement of this discussion has been removed by the arguments. In the first place, I agree entirely that we are not to look at the position of the particular tenant, that he has had to pay so much money down for the machinery and fixtures which are necessary for carrying on the works, but we must look at what, as the whole concern stands, would be the rent that an imaginary tenant would give for it as a whole, excluding from consideration whatever would be mere chattels, and would therefore not pass under a demise from the actual to the imaginary tenant. The way being thus cleared, the case presents, I think, no real difficulty to our deciding in respect of which of the various items the Company are entitled to have any deduction allowed in order to ascertain the rateable value of their premises. First I think counsel has altogether failed in showing that the meters are anything more than ordinary chattels. The other things, it is plain, fall under one of two classes of articles which are to be taken into account as enhancing the value of the building. The retorts, I am satisfied, are so far fixed to the freehold as to be attached and secured to it, and to become part of it; and they must be treated, therefore, not as removable fixtures, but as fixtures so connected with the freehold as to have become parcel of it. With regard to them, there is no difficulty; they are rateable as any part of the entire freehold would be. The other items seem to me one and all to fall within the principle of the cases referred to in the argument *Regina v. Southampton Dock Company* and *Regina v. North Staffordshire Railway Company*. In the latter case, the Court, after time taken to consider, laid down this rule: "That when things which, though capable of being removed, are yet so far attached as that it is intended that they should remain permanently connected with the railway or other undertaking, or with the premises used with it, and remain permanent appendages to it, as essential to its working, these must be taken to be things increasing the rateable value of the land, and in respect of which the Company are not entitled to have a deduction made." That principle applies directly to the present case. There can be no doubt that the purifiers and the gasholders are parts of the works which are absolutely necessary for the manufacture of gas, which is the purpose of the undertaking. There can be no doubt that it was intended, when those things were erected, that they should remain permanently connected with the premises; that they should remain permanent appendages to it, as essential to its working. They therefore fall within the rule laid down by the Court in that case. If the Company desired to abandon this undertaking, and to let the gas-works to another company or an individual, what the lessee would propose to take and pay rent for would not be land independent of all these articles, all of them essential to the manufacture—viz., gas. The retorts, purifiers, and gasholders are all as essential to the using and occupying of these premises as gas-works as any other thing that can possibly be suggested, however permanently attached to the freehold. They seem, therefore, clearly to come within the principle laid down in that case. There is another principle applicable here, on which the Court proceeded in the case of *Walmsley v. Milne*. The facts in that case were, the owner of land mortgaged it in fee, and afterwards erected certain buildings on it, to which, for the more convenient use of the premises in his business of an innkeeper, brewer, and bath proprietor, he affixed a steam engine and boiler, a hay cutter, a malt mill or corn crusher, and a pair of grinding stones. The lower grinding stone was boxed on to the floor of part of the premises by means of a frame screwed thereto, the upper one being fixed in usual way; and the steam-engine and other articles, except the boiler, were fastened by means of bolts and nuts to the walls or the floors, for the purpose of steadying them, but were all capable of being removed without injury either to themselves or to the premises. [So here it is possible that some of the articles—the steam-engine, the purifiers, and the gasholders—may be removed without injury to themselves or the premises.] The Court say, first, it appears that, as a matter of fact, all those articles were "firmly fixed to the freehold for the purpose of improving the inheritance, and not for any temporary purpose." And then the Court give their opinion on that state of facts. "When the mortgagor (who was the real owner of the inheritance), after the date of the mortgage, annexed them to the inheritance for a permanent purpose, and for the better enjoyment of his estate, he thereby made them part of the freehold which had been vested by the mortgage deed in the mortgagee, and consequently the plaintiffs, who are the assignees of the mortgagor, cannot maintain the present action." So here we cannot doubt, as a matter of fact, that when these purifiers, gasholders, steam-engines, and boilers, which are absolutely essential to the working of the manufacture were erected, it was with the view to their remaining permanently there for the benefit of the inheritance. I therefore think, on both grounds, these articles (except the meters) must be considered, if not as forming part of the freehold, still as so far connected with it as to be intended to be permanently attached to it, and therefore they ought to be taken into account in determining the rateable value of the land and the premises in question, and that no deduction can be allowed in respect of them. I think, therefore, that the Sessions were wrong in allowing these deductions, and that they must be disallowed, and the rate increased *pro tanto*.

BLACKBURN, J.: I am of the same opinion. The rateable value of the premises is to be determined under the Parochial Assessment Act, according to the rent that a hypothetical tenant, making the statutable deductions, would give for the rateable property; and the Sessions have quite properly proceeded to try to ascertain that rent. The property in this parish is a portion of a much larger property which the gas company possesses in this parish and in others. The first thing the Sessions had to do was to ascertain the rateable value of the entire property which the company possessed, and afterwards to see what proportion of it belongs to this parish. Now, in proceeding first to get at the value of the entire property, as it was not a thing which in practice is let to a tenant, the value cannot be ascertained by what people would give for it in the market; and the Sessions had, as is common in these cases, to ascertain for themselves what the value would be, looking at the elements which a tenant would take into consideration on renting from year to year. The question is, as was conceded: What would a hypothetical tenant give for the whole of the rateable property? And although, in point of fact, as stated in paragraph 18 of the case, the person who actually did occupy would not pay rent for portions of the property which are fixed to the rateable premises so as to become part of it, but which would be capable of removal, because, instead of paying rent, he would purchase them, yet we are agreed we must look to what a hypothetical tenant, taking the premises as they stand, would give for them, with those portions which were annexed to the property, so as, in effect, to become part of the rateable property. Upon that principle, the Sessions were wrong. I take it that it is quite clear that the principle established by the cases is this, to take an illustration: If you are rating a house let furnished, you would ascertain how much was paid in respect of the furniture and the things in no way forming part of the rateable premises; and deducting that from the rent paid for the furnished house, the remainder would be the rent given for the house itself, for which it would be rateable. The question then would arise, and must arise, what the things are for which you are to make an allowance and deduction—whether they are in themselves part of the premises, or are, like the furniture, not part of the premises. Now, there are some fixtures that are attached to the premises, and are part of the premises; although, as between landlord and tenant, and heirs and executors, there is a right to remove them. Clearly, no allowance is to be made for those. There are other things, such as movable furniture, which are manifestly not part of the house, and for which allowance must be made. But there are intermediate things, with respect to which it is sometimes very difficult to determine whether they are made part of the premises or not; and upon those the question mainly arises in the present case. The rule laid down has been that, where the things are attached to the premises so as to be part of the premises, although they are removable, still they are part of the premises, although there may be a right to remove them. But if things or chattels be fixed to the premises, but so as to be still chattels, being only fixed and steadied for the purposes of use there, they remain chattels altogether, so that they would not be part of the premises at all; they would never cease—to use the phrase in the case of *Hellawell v. Eastwood*—to have the character of movable chattels. Although fixed for the purpose of the enjoyment of them, still they remain movable chattels. The common illustration is a mirror, which, in the ordinary way, would be screwed to the wall; still, it remains a movable chattel, and is no part of the premises. On the other hand, a grate which is built into a chimney, although it is capable of being removed by a tenant, would still be fixed to the premises, so that it would be part of the premises, and therefore part of what would be considered to be let to the hypothetical tenant, and for which he would pay rent. The difficulty is to apply the distinction to the present case. We find, in the case of *Hellawell v. Eastwood*, that the Court of Exchequer were dealing with machinery that was fixed and screwed and attached to the premises; and they laid down the rule, as being "a question of fact depending upon the circumstances of each case, but principally on two considerations: First, the mode of annexation to the soil or the fabric of the house, and the extent to which the thing is united to them, whether it can be easily removed '*integre, salve, et commode*,' or not without injury to itself or the fabric of the building;" secondly—and this is what I am calling attention to—"on the subject and purpose of the annexation, whether it was for the permanent and substantial improvement of the dwelling, in the language of the civil law, '*perpetui usus causa*,' or in that of the Year Book, '*pour un profit de l'inheritance*,' or merely for a temporary purpose, or the more complete enjoyment and use of it as a chattel." In that case, the Court of Exchequer thought the things were only put up and

fastened in such a way as to be for temporary use and enjoyment as chattels. But they put it clearly and distinctly that the two important elements to consider are: First, the degree of annexation; and, secondly, if it be in fact annexed, the object of the annexation, whether it was for the improvement of the inheritance that it was attached to a part of the inheritance, or whether it was for the enjoyment only of the thing itself. In the case that my Lord referred to, of *Walmsley v. Milne*, which was very nearly a similar case, as far as the facts went, to *Hellawell v. Eastwood*, the Court of Common Pleas laid down the same rule, and came to the conclusion that the machinery and things were firmly fixed to the freehold for the purpose of improving the inheritance; and taking that view, they thought they were attached to the inheritance so as to become part of it. That is the rule laid down there, and the definition as to when the thing ceased to be a chattel, so as to become part of the inheritance, although it might be removed. That was the principle laid down (though not in the precise words, the same idea is conveyed) in the case of *Regina v. North Staffordshire Railway Company*, where the things in question were similar to those in *Regina v. Southampton Dock Company*. Deductions were claimed for cranes, turntables, and a variety of other things which were attached to the premises of the Railway Company, some of them firmly attached and some of them not. The Court said that the things which were not attached to the freehold were to be deducted, and an allowance made for them; and the things which were affixed to the freehold clearly would not be allowed for. Then the rule laid down for the guidance of the Sessions was this: "The articles may be divided into three classes. First, things movable, such as office and station furniture." It is clear these are not to be included. "Secondly, things so attached to the freehold as to become part of it." It is clear, on the principle of all the cases, that no deduction is to be made for them, and they are to be considered as part of what is let. "Thirdly, things which, though capable of being removed, were yet so far attached as that they were intended to remain permanently connected with the railway or the premises used with it, and to remain permanent appendages to it, as essential to its working." That phrase, as it appears to me, contains the same idea as is stated in the case of *Hellawell v. Eastwood*, where the test is said to be, citing from the Year Book, whether the thing be fixed "*pour un profit de l'inheritance*," and, again, in the case of *Walmsley v. Milne*, where it was said the question was whether the articles were annexed for the better enjoyment of the estate. The idea is throughout the same, if the things are annexed, though but slightly, with a view to the enhancement of the inheritance and the permanent improvement of it, they may be considered as part of it for which a hypothetical tenant would be considered rateable. Now, applying this rule to the present case, though I was inclined at first to take an opposite view as to some of these articles, they are all, with the exception of the meters, attached to the premises, although but slightly. Nevertheless, I think it is clear they all are in fact attached to the premises, and equally clear they all are in fact attached to the premises with the view of enhancing the benefit of the premises, so as to come within the principle laid down in the cases I have mentioned. The meters stand on a different footing. They are chattels themselves, except so far as they are attached to the houses in which they are put up. They are attached to the houses by a pipe which comes in through the wall and is fastened to the meter. If the meter was attached to the house so as to render it part of the house to improve it, then it would become fixed property. But, in fact, it is obvious that the meters are kept as the company's meters, to be used as their chattels for measuring the gas, and were never intended to be for the benefit of the house to which they are attached at all—they are not part of the inheritance of the company, and cannot be said to be so. Counsel endeavoured in his argument to make out that a meter occupies part of the space of the house, and therefore the company did by the meter occupy part of the house. That is not so. Although the meter is firmly fixed to the house, steadied by being fixed, that does not make the company the occupier of any portion of the house, any more than a person who has hired out or let a chattel which is not fixed to the house but is enjoyed as a chattel. For these reasons I think the meters are properly matters of deduction, and the rest are not. The rate must be amended accordingly.

Lush, J.: I am of the same opinion. The sum to be ascertained is "the net annual value of these premises at which they might reasonably be expected to let from year to year free of all usual tenant's rates and taxes, and deducting the probable average annual expenses necessary to maintain them in a state to command that rent." The question is, what is the rateable subject which is comprised within the premises to be rated? Now, I apprehend that the premises to be rated are to be taken as they are, with all their fittings and appliances by which the owner has adapted them to a particular use, and which would pass as a part of the premises by a demise of them to a tenant. That seems to me to express what in other words has been expressed in the cases referred to by the other members of the Court. Wherever the things have become so far a part of the premises that they would pass by a demise of these premises, they would form a part of the rateable subject of the inheritance for the purpose of rating. When we have to apply this test to any particular thing, the question is not what a tenant might remove, nor what might be taken in execution, but what, as between landlord and tenant, would pass as part of the premises which he would let and the tenant would take. Now, applying this rule, I cannot entertain a doubt that, with the exception of the meters, all the subjects of discussion here would pass as a necessary part of these premises. Without the retorts, purifiers, steam-engines, and gasholders, the premises would be worthless for the purpose for which they were erected—the building would not be a gas manufactory at all. All these things are fixed and so far annexed as to be intended to be permanent, and as really necessary for the use of the premises as gas-works. Therefore, I think, except the meters, that deductions in respect of none of these items ought to be allowed in ascertaining the ultimate net annual value. The meters are on a different footing, and in no sense a part of the gas-works. They are not upon the land occupied by the company, and are not fixed in such a way as to be part of the freehold. I was struck in the early part of the argument with the finding in the 18th paragraph of the case. It appeared to me to distinguish this from the other cases, and for a time I entertained considerable doubt whether, on account of what was found there, all these items, although forming part of the rateable premises, ought not to be deducted. The finding is, "that, according to the practice and course of business in letting and hiring gas-works, the tenant would have to take to, and find capital for, all the property comprised under the heads meters, retorts, tenant's fixtures, and utensils, and would have to provide £150,000 for that purpose; and that a deduction in respect of such outlay was to be made in estimating, according to the provisions of the Parochial Assessment Act, what rent a tenant from year to year would give." It struck me at first, as the tenant would be bound, if he took these premises, to make an outlay by purchasing all these articles, that the rent he would pay would be so much less, and that rent would represent the rateable value. Upon consideration, I quite agree with the other members of the Court, and I am satisfied that that is not the right view, on the hypothesis that all these things, except the meters, do form part of the rateable subject, and ought to be taken into consideration in estimating the rateable value; for to say that because a tenant and a landlord agree, before the place is let, that the tenant should pay down a price for part—that is, purchase part of the freehold—the rateable value would be by so much diminished, would be absurd. I agree, therefore, that it makes no difference at all whether the tenant rents the whole, or whether by contract between him and the landlord he purchases the fixed plant, which, if not so purchased, would be a part of the permanent premises; and that, except the meters, all the other matters are rateable, and that the deductions in respect of them ought to be disallowed.

APPENDIX "C."

IPSWICH GASLIGHT COMPANY v. IPSWICH UNION AND OTHERS. HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Wednesday, Dec. 18, 1907.

[From the "Journal of Gas Lighting," Dec. 24, 1907, p. 919.]

Judgment.

Justice Channell said they were of opinion that in this case the appeal must be dismissed. He was anxious, before giving any judgment, to refer to the case of the *Mersey Dock and Harbour Board v. Birkenhead Assessment Committee* in the House of Lords, because, according to his recollection, it was laid down in that case that all these things were questions of fact and not of law. He could not help feeling that all the matters that were put to the Court in the present case were—accepting as correct the doctrine laid down by the House of Lords—really questions of fact. He should be sorry, however, when parties had stated a case raising questions upon which they wanted the decision of the Court, to give no answer to them and simply to say they had no jurisdiction to entertain the case. Therefore, while protecting himself in this way, he was ready to give the answer that appeared to him to be right, upon the assumption that this was a matter they were entitled to consider as one of law and not of fact. The question was what rent a hypothetical tenant would give for the premises the gas company occupied. Then there arose the question of the allowance to be made in respect of tenant's capital; and the Court was asked to say whether it was right for the Recorder to treat, as he did, the expenditure on prepayment meters, stoves, and similar things—right to treat the money expended on these things as tenant's capital in respect of which an allowance ought to be made. His answer was that if the receipts arising from these articles were in fact brought into the accounts as profits in the gross profits of the business, then it most certainly was right to include them. Otherwise, on the assumption that they were not part of the things which the tenant would pay rent for, they were not rateable. If they brought them into account as part of the profits of the business, and a hypothetical tenant would pay for the premises a rent calculated on the estimate that he would get certain sums of money with respect of these things, then they must bring into account the amount he would have to expend in order to do this. It was incontestable that they must be brought into account in some way; but Mr. Avory said the proper way was to take them out of the receipts. But this was a way of taking them out of the receipts. The question of whether 17½ per cent. was too high was a matter of fact for the Recorder on the figures. The answer, therefore, to the question seemed to be that both these things must be taken into account, because, in point of fact, they had been agreed to be taken as part of the receipts of the business. Mr. Avory's suggestion was that, though this was capital expended for business, it was not for this business, but for some sort of outside business really belonging to plumbers or ironmongers who supplied gas-fittings. If this was the case then the profits ought not to be in the receipts; but if it was agreed that they were profits of this business, and therefore its receipts, it seemed to him they came in as tenant's capital. As he had put forward other reasons in the course of the argument it was unnecessary to give a more lengthy judgment. These were the reasons why he thought the appeal should be dismissed.

Justices Bray and Sutton concurred.

The last number to hand of the "Journal des Usines à Gaz" contains a summary of the proceedings at a recent meeting of the Committee of the Société Technique du Gaz en France, at which the President (M. Marquisan) stated that a proposal had been submitted to them for a federation of all the technical associations in France. After a few remarks, it was decided to take the subject into consideration in conjunction with the Society of Civil Engineers of France; and the President and M. Rouland (the Vice-President) were nominated for the purpose. On the same occasion, M. Rouland stated that the Committee of the Paris Gas Company (of which he is the Managing-Director) were organizing a competition for the best appliance for heating apartments by gas, from the hygienic standpoint, as well as with regard to economy and heat produced. Three members of the Committee of the Society were appointed to act with the other judges.

AERIAL OR WIRE ROPEWAYS: THEIR CONSTRUCTION AND MANAGEMENT.*

THE information contained in this book on this interesting subject is considerable; and the extent of the wire ropeways in use in different parts of the world will come as a surprise to many readers. It is a system of transport which appears to have been overlooked to some extent by engineers. The method has so many natural advantages that its possibilities and easy adaptations to steep gradients and other tracts difficult to negotiate by other means should be brought to the notice of all engineers.

The details of the system are well told in seven chapters, each dealing with the various methods employed in the construction and working of different systems of aerial transport. Chapter I. describes briefly the types of ropeways in more general use; while chapter II., comprising 56 pages, gives in detail the method of construction of the posts or standards, the wire rope lines, the carrier boxes or saddles for both the running-rope and fixed carrying-rope systems; also the carrier trucks or runners for the latter. The same chapter also deals with friction grips or couplings, the knots or carrier collars for couplings, and the various locking grips employed. Carrier receptacles or vehicles also come in for attention in this chapter, with a somewhat short account of the various forms of motive power in general use.

Chapter III., on telpherage, will be of special interest to gas engineers. Many installations for the conveyance of coal and coke have been recently fitted up in gas-works; and it is a system which adapts itself to the special conditions to be found in such works. This system and its effectiveness at the present day is largely due to the labours of Professor Jenkin, who, however, died so long ago as 1885; but not before he had brought the system of telpherage to a considerable degree of perfection. All the essential details are carefully explained in this chapter; and the matter is more clearly understood owing to the inclusion of a number of illustrations.

Chapter IV. describes in detail a large number of installations on the running-rope system. In several cases both the cost of the installation and the running expenses are given, by which means the reader is enabled to judge the efficacy of the system for many purposes. The outlay is shown to be strikingly small in cases where the conditions are at all favourable. For instance, a ropeway erected at Teil, in France, of a total length of 1558 feet, cost £100, and is capable of conveying 70 tons a day; another, at St. Imier, of 8200 feet in length, cost £520, and carries 50 tons a day. Thus it will be seen that wire ropeways costing very little are capable of carrying large quantities over considerable distances. It is a system which is, of course, peculiarly suitable for conveying agricultural produce over tracts of land otherwise almost unworkable, also for transport work in mountain districts.

Chapter V. gives similar details of installations on the fixed-rope system. It explains, among other things, the method by means of which the action of gravity is made to provide the necessary power for working the line. Included in this chapter is a description of a short line of single fixed wire ropeway erected some years ago at the Nine Elms Gas-Works. The ropeway was used for the transportation of about 25 tons of coal per hour across a dock, a distance of 450 feet between the supports. The capacity of the carrier receptacle was about 17 cwt., and the load was hauled up an incline of 1 in 19, at a speed of 5 miles an hour, by an engine of 6 H.P. At each end of the line was placed a hopper for filling and emptying the buckets. The single carrying rope, which was stretched across the dock, was of crucible-steel wire of 40 tons breaking strain; while the hauling rope was of 4½ tons breaking strain. Three men were required to work the ropeway; and the cost of labour was said to be 0·88d. per ton, and wear and tear 0·4d., of which the ropes accounted for 0·26d. per ton. The entire cost of working, with the exception of fuel, was 1·28d. per ton; while the initial outlay on machinery, ropes, and engine was £340. It is stated that after working successfully for some time it had to be removed for building operations.

As an example of the steep gradients which may be worked by this system, there is briefly described a line constructed for the War Office, at Gibraltar, by Messrs. Bullivant and Co. In this case, the average incline is 1 in 1·6; and the longest span one of 1100 feet, though this (the space) is by no means excessive, as in some cases the span between the supports has amounted to over 4000 feet. The descriptions and illustrations of installations of wire ropeways, of which no less than 33 are given in Chapters IV. and V., form an important feature of the book, and include information of a most varied and detailed nature.

An interesting account is given in Chapter VI. of wire ropeways for hoisting and conveying. There are many purposes for which this combination is required, such as the removal of earth from trenches during excavating operations, grabbing from a river bed, also for use in building bridges, canals, railways, and for working quarries. The author concludes with a detailed synopsis of general information on such matters as the calculation of the strain on carrying ropes, splicing and securing wire ropes, rope attachments, and the preserving of wire ropes. Very useful, too, is an approximate price-list of ropeways on the endless-rope system, and a table giving the horse power necessary to propel 1000 lbs. at various speeds and up various grades. From this table it is seen that 2 H.P. is sufficient to propel a load of 1000 lbs. weight up a 2 per cent. gradient at a speed of 25 miles an hour. This is the sort of result that is typical of the system.

The author makes out an excellent case for the installation of wire ropeways wherever they are at all suitable. Speaking generally, they may be said to be particularly well adapted for conveying materials over long distances—say, from ¼ mile to 20 miles—in comparatively small quantities, usually from 1 cwt. to 1 ton. Steep gradients are no bar to the successful working of a rope line, and curves are easily surmounted by erecting angle stations; but the latter somewhat add to the cost of working. The cost of transport by this means is distinctly cheap, the upkeep is very moderate, the power required for traction is small, while the initial outlay is quite reasonable. It is an additional advantage that the land over which the ropeway passes is in no way affected, and, moreover, it is sometimes an advantage that with an endless rope system power may be taken from the rope at any point over which it passes.

The volume is clearly written, and its 228 pages are full of detailed descriptions of the nature required by technical readers. No less than 155 illustrations are included; and they give the reader an excellent opportunity of studying every detail of the various systems and methods employed. The book may thus be thoroughly recommended.

* "Aerial or Wire Ropeways: Their Construction and Management." By A. J. Wallis-Taylor. London: Crosby Lockwood and Son. 1911. [Price 7s. 6d. net.]

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

A Meeting of the London and Southern District Junior Gas Association was held on Friday evening, at the Westminster Technical Institute, Vincent Square, S.W.—Mr. L. F. TOOTH, the President, in the chair.

SOME ANNOUNCEMENTS.

The PRESIDENT, at the opening of the proceedings, referring to the fund being raised by the Association for the family of the late Mr. Rothwell, said he was pleased to be able to tell the members that a good response was being made to the appeal. Already the amount had reached about £10; but they were anxious to get together a really substantial sum, because, as he had already pointed out, it was one of the most deserving cases that had come before them since the commencement of the Association. Continuing, he reminded them that the annual dinner had been fixed for March 4, and everything promised a most successful evening. Then there was to be a visit on Thursday, March 9, to Gillingham. The Secretary wanted as early as possible the names of those who would join the party, as he was hoping to secure a little concession from the Railway Company. To the programme of a visit to the gas-works and to the Chatham Dockyard, had been added an inspection of the School of Engineering, which had been kindly arranged for by Mr. C. Tanner. The visit would occupy a whole day.

SOME PHENOMENA AND APPLICATIONS OF ELECTRIC CURRENTS

Mr. J. G. CLARK, of the Gaslight and Coke Company, then presented a paper entitled "Some Phenomena and Applications of the Electric Current." Lecturing on the paper, rather than reading it in its entirety, and having a quantity of electrical heating and other apparatus in action, Mr. Clark spared no pains to make the various points clear to his audience; and great interest in the subject was manifested by all present. The paper, and a report of the discussion to which it gave rise, will be found on p. 605.

Mr. E. G. STEWART, in proposing a hearty vote of thanks to the author, said he had brought forward a great number of interesting and valuable points, and had explained them in a very simple manner. In fact, the explanation of the power factor was one of the simplest he had ever come across.

Mr. G. F. COX seconded, and remarked that the members were to be congratulated on not having to go outside the Association for a lecture of this character. He hoped that what Mr. Clark had said would set them on the high-road to learning more of their opponents.

The vote having been carried with applause,

Mr. CLARK, in acknowledgment, pointed out that it was certainly important that they should be well equipped in matters appertaining to electricity; and it would be more so in the future than it had been in the past.

The Glasgow Verticals.—By a regrettable mistake in reading the copy sent last week, on which the paragraph on p. 528 of the "JOURNAL" was based, the installation of vertical retorts to be erected at the Temple Gas-Works at Glasgow was given as 744, instead of the correct number of 144.

New Edition of Hornby on "Gas Manufacture."—We have received from the publishers, Messrs. G. Bell and Sons, Limited, the sixth edition (revised and enlarged) of Mr. John Hornby's "Text-Book of Gas Manufacture for Students." Owing to advances in the carbonizing department, it was found necessary to make such additions to the book that the publishers decided to have the whole work recast; and the present edition is the result. It will be noticed at greater length in a subsequent number of the "JOURNAL." The price is 7s. 6d. net.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

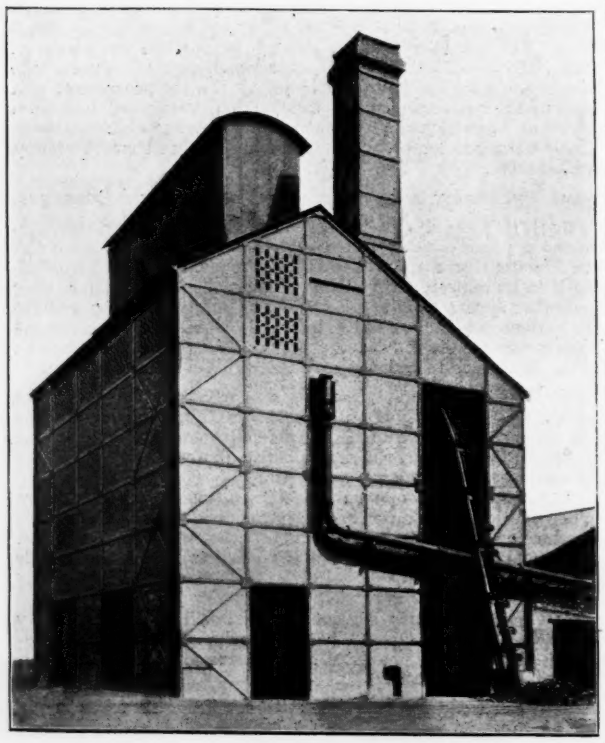
Annual Meeting last Saturday.

A very attractive programme was issued for the forty-first annual meeting of the Manchester District Institution of Gas Engineers on Saturday. The Gas Committee of the Manchester Corporation had given permission for the members to visit the Droylsden Gas-Works, to inspect the Glover-West installation of vertical retorts that has been in operation there since July last year, with most satisfactory results. The visit and the importance of the subsequent proceedings necessitated an early start. But, early though it was, Mr. Alexander Wilson, of Glasgow, was able to be present as President of the Institution of Gas Engineers, and remained with the party all day.

Assembling at George Street, Piccadilly, Manchester, at half past ten o'clock, the party found two special tram-cars in readiness to convey them to Droylsden. Arriving there they found a considerable number of members who had gone there direct. On entering the works, each visitor was presented with a small pamphlet, prepared by Mr. J. G. Newbigging, M.Inst.C.E., the Chief Engineer of the Manchester Gas Department, in which (before giving some particulars of the plant to be inspected) he explained that, in view of the fact that he had promised to contribute a paper on the working of the installation at the Glasgow meeting of the Institution of Gas Engineers in June next, he regretted he was unable to give the detailed particulars of the plant he would otherwise have been prepared to put forward at the present meeting. He, however, was able to give the following particulars as to

THE GLOVER-WEST VERTICAL RETORTS.

The installation consists of sixteen retorts; and the capacity is approximately 500,000 cubic feet of gas per 24 hours, though the daily output has reached as much as 560,000 cubic feet. The installation was put into work on July 12 last, and has been in continuous operation ever since. The whole of the retorts on the works were put out of action immediately the new plant was started; and 16·5 to 17 candle power gas produced in the vertical retorts has been regularly supplied to the Droylsden district without the use of cannel enrichment as heretofore.



The Glover-West Vertical Retort-House at Droylsden.

A number of tests have been carried out on the plant, and have produced very satisfactory results. The weight of coal carbonized per retort per 24 hours on these tests has varied from 50 cwt. to 64 cwt., with a fuel consumption ranging from 9 lbs. to 12 lbs. of coke per 100 lbs. of coal carbonized.

In comparing the details of this installation with those of the first plant of the Glover-West vertical retorts at St. Helens, which the Institution has inspected,* it was observed that at Droylsden each retort is entirely separated—having its own charging and discharging chambers. In this plant, the vertical retort worm for extracting the coke takes the place of the revolving arm at St. Helens; and it is possible to vary the speed of each individual retort, in addition to being able to vary the speed of the whole battery from the main driving gear. In lieu of the water-lute seal for the coke-chamber outlet door as at St. Helens, a self-sealing mouthpiece has been introduced, which works most satisfactorily. The regenerator and cooling chamber in the bottom portion of the retort on this plant is of cast iron. These details, in addition to others, which have been introduced into this plant, have conduced to improved results.

It was arranged for two of the retorts to be empty for inspection, in order to afford an opportunity for observing the facilities for getting at the retorts and the general condition of same.

These retorts and the silica fire materials are of British manufacture and are made of very special material. Pieces of these materials were tested by Dr. J. W. Mellor, of the Staffordshire Counties Laboratory, before erection, and withstood the specified temperature of over 3000° Fahr.

In the course of the inspection, some further interesting particulars were gathered while members conversed with Mr. Newbigging, Mr. Samuel Glover, Mr. John West, and Mr. Fred J. West. For instance, at Droylsden, there is a coal-valve and coal-hopper to each retort, whereas at St. Helens there is one valve feeding two retorts, and the coal-hopper is continuous. The coal-valve is also detached from the coal-bunker. This is to allow for due expansion of the setting; also for their removal when the retorts require renewing. There is also a large sealed circular door with a ball on top, for easy access to the inside of the retorts. This is a great improvement. The decension pipes and the valves to the collecting main are also larger than those at St. Helens. The vertical buckstaves and the horizontal bracing around the bench have been made stronger than at St. Helens. They were considered to be quite strong enough at St. Helens; but as the expansion of the brickwork is very powerful, it was considered advisable not to run the risk of there being any liability for the various chambers conveying the producer and other gases and the secondary air either getting cracked or giving way in the slightest degree. The sealed coke-door (in lieu of the water-lute) is certainly a great step in advance. It is easily manipulated and is very effective.

The building in which the plant is installed was designed on scientific principles. As shown in the photograph reproduced, it is of light yet strong construction. It was certainly admired on Saturday by everybody present, and more especially by those who knew most about steel constructed buildings.

It may be remembered that Mr. West, in his remarks at St. Helens, referred to the retorts used there being of British manufacture, and that there are plenty of good makers of fire goods if gas companies and corporations will only pay for good materials. In the present case, Mr. West prepared a specification for the retort-makers; and the retorts have quite come up to requirements. He has had the retorts tested (as explained in Mr. Newbigging's notes) by an expert who has been doing good work for a long time in this respect; and it is satisfactory to learn that the Refractory Materials Committee of the Institution of Gas Engineers have discovered Dr. Mellor, as he will certainly be able to help them.

The whole operation of the retorts was watched with great interest for an hour and more—the discharging of the barely hot coke being a revelation to many of those present; also the almost entire absence of smoke and fumes about the place.

The return by tram to the city was made in time to allow of the members lunching together, at the Grand Hotel, before the formal business of the day commenced.

THE AFTERNOON'S PROCEEDINGS.

These commenced at 2.15; the chair being taken by the retiring PRESIDENT, Mr. Henry Kendrick, of Stretford.

DEATH OF TWO MEMBERS.

Since the last meeting, two members of the Institution have died—Mr. Charles Elliott, of Leyland, and Mr. G. E. Saville, of Southport; and letters were read from relatives acknowledging the resolutions of condolence with them in their bereavement passed by the Council.

The PRESIDENT, referring to the loss the Institution had suffered by these deaths, said that Mr. Saville had been a member for a very long time, and belonged to what might be called the older school of gas managers, not known to those of the present day. The late Mr. Elliott had also been a member of the Institution for many years, and was held in high esteem by all who knew him.

ANNUAL REPORT OF COMMITTEE—BENEVOLENT FUND APPEAL.

As there was a considerable amount of business to be got through, the PRESIDENT suggested that the annual report of the Committee should be taken as read. This was agreed to.

In the course of their report, the Committee point out that the number of members on the books is now 176—showing an increase for last year

* See "JOURNAL," Vol. CVIII., p. 314.

of 10. Three members have resigned; three have lapsed in accordance with rule 14; and the Committee regret to record the death of the following members: Mr. Edmund Lord, of Whitworth, elected August, 1871; Mr. G. B. Smedley, of Swadlincote, elected February, 1901; Mr. Chas. Elliott, of Leyland, elected September, 1883; Mr. G. E. Saville, of Southport, elected March, 1876.

They mention that rule 2 has been amended, to enable the Chairman for the time being of the Commercial Sections of Lancashire and Yorkshire respectively, to be *ex-officio* members of Institution Committee; also that the work of both the Lancashire and Yorkshire Commercial Sections "continues to flourish, as will be observed from the published reports which have been issued to all the members of the Institution." The President (Mr. Kendrick) and Mr. J. Furniss, of Slaithwaite, were elected representatives of the Institution on the Committees of the Lancashire and Yorkshire Junior Associations respectively; and the Honorary Secretary was again elected as the representative of the Institution on the Council of the Institution of Gas Engineers.

In conjunction with the Junior Association, two courses of lectures, on "The Science of Gas Manufacture and Combustion," have been arranged to be given at the Manchester University; and the satisfactory attendance is an appreciation of the efforts put forth by the promoters. An effort has also been made to improve the status and education of plumbers and gas-fitters; and lectures on gas-fittings and gas appliances have been given at the Manchester Technical School and the Royal Technical Institute, Salford, which have been well attended by local workmen.

A further appeal is made for contributions to the Benevolent Fund of the Institution of Gas Engineers; and the Committee state that, although the membership of the Institution numbers 176, there are only 51 subscribers to the fund, which is in need of further support. The Committee contributed ten guineas from the funds.

The balance-sheet shows £61 17s. 8d. in hand, against £67 18s. 11d., or a decrease only of £6 1s. 3d., although there is an additional charge of £11 9s. 6d. in last year's account for railway fares of Committee. The total amount granted for educational and benevolent purposes also shows an increase—being £30 10s., as against £26 5s. in 1910.

Mr. Charles Potts (Hyde) moved the adoption of the report; and Mr. J. W. Morrison (Sheffield) seconded the motion.

Mr. T. Duxbury (Oldham) called the attention of the members to a paragraph in the report making a further appeal for contributions to the Benevolent Fund of the Institution of Gas Engineers. As their representative on the Committee of the fund, he said he should like once again to impress upon members the need there was for still more subscriptions. It would be seen that out of 176 members of the Manchester Institution they had 51 subscribers to the fund. He was perfectly well aware that gas engineers had in their own towns many appeals made to them for subscriptions to various objects, and were much "pulled at" in this way. But the Benevolent Fund of the Institution of Gas Engineers was such a worthy object that he hoped greater support would be given to it. He could assure those present that the fund was doing very valuable work; and he was certain if members only knew a fraction of what was being done by the Committee, there would be a great many more subscribers than was now the case. It was true that they of the Manchester District had as many subscribers as any other part of the country; but he did not think this was quite sufficient. They generally took the lead in most things; and he wished they could take the lead in this very worthy object. They would be glad to receive subscriptions from 5s. upwards to the fund, which, as he had said, was well worthy of their support. As a member of the Committee, he could assure them that the money was well spent, and that each case dealt with was thoroughly investigated.

The President endorsed the remarks made by Mr. Duxbury, and expressed the hope that the appeal made would result in a large increase in the subscriptions, which, at present, were not, in his opinion, representative of the great industry in which they were engaged. Until a year or two ago, the subscriptions from the Manchester Institution did not come up to those of other District Associations; and there was a neighbouring organization with some 50 members less than the Manchester Institution contributing more than they did. This was not a very nice position to be in—that a smaller Association should be in front of them; and therefore he trusted that members would take to heart what had been said by Mr. Duxbury, and in the next twelve months place Manchester again in the front in this matter.

The report was then adopted.

Finance.

On the motion of Mr. E. A. Harman (Huddersfield), seconded by Mr. John Furniss (Slaithwaite), the balance-sheet was adopted. It showed that, despite heavier expenditure in certain directions, there was at the end of the year a balance in hand of £61 17s. 8d., against £67 18s. 11d. in the preceding year. The expenditure included a grant of £20 for the Manchester University Lectures, and a donation of £10 10s. to the Benevolent Fund of the Institution of Gas Engineers.

Reports of the Commercial Sections.

Mr. Charles Wood (Bradford) moved the adoption of the reports of the Commercial Sections; and Mr. S. E. Halliwell (Littleborough) seconded the motion.

Mr. T. Duxbury (Oldham), in congratulating the members of the Commercial Sections upon the work done, said he was glad to see they had, as far as they possibly could, left out subjects of a technical character suitable for discussion at ordinary meetings of the Institution. The Commercial Sections had taken the hint he ventured to throw out on this point; and, in his opinion, it would be to the benefit of the Institution. They always wanted papers for the general meetings; and he hoped that the Commercial Sections, which were certainly doing good work, would in the coming year follow out what they had done during the past twelve months, and leave technical papers suitable for consideration at the general meetings.

The motion was carried.

Representative on the Parent Institution Council.

On the nomination of a member to represent the Institution on the Council of the Institution of Gas Engineers for 1911-12,

Mr. Morrison moved the re-election of Mr. W. Whatmough, the Hon. Secretary.

Mr. Whatmough pointed out, however, that, according to the rules of the Institution, a representative member could only stand for three years. He had been their representative for this period, and the time had come when it was necessary to elect someone else. In his opinion, they could not have a better representative than Mr. Kendrick; and he moved that the retiring President be nominated for the position, being certain that he would be an acquisition to the Council.

Mr. Harman seconded the motion, Mr. J. W. Brearley (Longwood) supported it, and it was carried unanimously.

Mr. Kendrick, in acknowledging the vote, said he would rather have gone forward in the ordinary way for membership of the Council, and again faced the ballot. Seeing, however, that it was the unanimous wish of the meeting, he accepted nomination as their representative, and assured them that the interests of the Manchester Institution would not suffer in the Council of the Parent Institution.

Gas-Fitters' Education Scheme.

The following report of the Committee on the Gas-Fitters' Education Scheme was presented:—

The work you undertook last May seems to be likely to bear good fruit in at least two directions—namely, that the Ironmongers' Associations and Gas-Fitters' Associations have admitted the necessity of more fully training their young men, and the attention of several other districts has been drawn to the absence of training centres; and steps are being taken to supply the deficiency.

Correspondence has been carried on with the Plumbers' Institute, the Ironmongers' Federated Association, and the Birmingham Master Gas-Fitters' Association. The Secretary of the former has informed us that his Committee are not favourable to the suggestions laid before them; but the two latter are not only in favour but have taken steps to arrange for the tuition of their apprentices and younger men. The only criticism raised has been to the suggestion made to the Plumbers' Institute, that the National Associations of Plumbers and the Advisory Committee should issue certificates of proficiency. Mr. Robert Hall, the President of the I.F.A., sends the following resolution, dated Jan. 5, 1911:—

> That the Birmingham Association was in entire sympathy with the scheme regarding the education of the young gas-fitter, and would do all in its power to forward it—at the same time suggesting that the examinations and the issuing of certificates should be rather with the Society of Gas Engineers than the Plumbers' Institute.

A representative of the Birmingham Master Gas-Fitters' Association makes the same suggestion; and a reply has been sent to both, that a suggestion would be made to the authorities that the certificates should be given by a Joint Committee in each district representing all the interested parties—ironmongers, gas-fitters, plumbers, and gas managers—and that further experience has proved that the most satisfactory form of examination would be practical and oral rather than written. If there is to be a written examination at all, it should be of a very general character and following the others.

It was also pointed out that the movement commenced and was confined at first to the Manchester district. Your Committee, in order to find out if the work would be supported by the trade, decided to approach the Plumbers' Institute first of all, as they represented the only body of organized workers in the district engaged in the gas-fitting trade. But this Institution was by no means desirous of shutting out any worker engaged in gas-fitting.

One of the correspondents says that "gas-fitting is becoming sufficiently important of itself to warrant regarding it as a distinct trade or profession. Therefore, while tackling the problem, I think we might look ahead, and to-day lay a foundation, not for the trade as it is, but as we hope it will be."

From the "Ironmongers' Weekly" of Dec. 10, 1910, we find that the late Mr. Hampton Barber had originated classes in gas-fitting at the Birmingham Municipal Technical School; but that those attending up to now were mainly the youths connected with the Gas Department. At the present time, the Birmingham Gas Department were instructing their own youths, though the Technical School Classes were being still carried on.

At Southport, Mr. John Bond has commenced a series of lectures at the show-room to the local ironmongers. At Nottingham, also, lectures have been arranged for by an official of the Gas Department; and during the past fortnight the Birmingham ironmongers have also favourably received the proposal.

The "Ironmonger"—the official organ of the I.F.A.—has attempted to raise opposition to the proposals, mainly in the interests of the ironmongers; but Mr. Robert Hall wrote immediately that "the Editor's criticisms upon your scheme of technical education do not represent ours. Anyway, your proposals have borne fruit."

The matter has now gone so far that further steps are inevitable, and your Committee desire powers to call a representative meeting of all interested, with a view of arriving at a plan that will meet with general

acceptance, and suggest that the Council of the Institution of Gas Engineers be invited to send representatives.

(Signed),
H. KENDRICK, President.
W. WHATMOUGH, Hon. Sec.

After some discussion, the report as given above was adopted.

A PRESENTATION.

At this stage of the proceedings, a presentation was made to Mr. S. E. Halliwell, of Littleborough, by the members of the Lancashire Commercial Section, as some slight recognition of the services he had rendered to the section as Hon. Secretary. The presentation took the form of a handsome gold watch, with an inscription setting forth the circumstances under which it was given. There was also a diamond and sapphire dress ring for Mrs. Halliwell.

Mr. S. MEUNIER (Stockport), who, as Chairman of the Section, made the presentation on behalf of the subscribers, said that Mr. Halliwell was one of the best officials the Commercial Section had ever had. Members of the Institution could see for themselves, from the reports, how well the work was done; and the section was fortunate in having a gentleman like Mr. Halliwell willing and ambitious enough to undertake the onerous duties of Hon. Secretary.

The PRESIDENT supported the remarks of Mr. Meunier. He said that, having had some experience of secretarial work, he could appreciate perhaps more than most of those present the great services Mr. Halliwell rendered to the Commercial Section with its twenty-four meetings a year.

Mr. HALLIWELL, responding, said he was pleased to find that what he had been able to do for the Commercial Section had been appreciated, quite apart from the gifts. He had no hesitation in saying that his work had been of great personal value to him in carrying out his duties, as well as to the Company he served.

THE NEW PRESIDENT.

Mr. KENDRICK said the next item on the *agenda* was the induction of the President-elect, Mr. Robert Watson, of Doncaster, to whose qualifications for the position he paid a high tribute. He said in Mr. Watson they had a man who would do honour to the Institution, both as its President and, he hoped, in the future as a member of the Institution Council as well. He had given them the benefit of his advice and support; and the papers he had contributed showed a depth of knowledge as to gas undertakings that fell to the lot of very few of them. In asking Mr. Watson to take the chair, he was quite certain he was vacating it for one who would uphold the dignity of the position, and add lustre to it.

Mr. WATSON then took the chair, and, having acknowledged the compliment paid him, moved a vote of thanks to Mr. Kendrick for his services as President during the past year. He said that, a year ago, when Mr. Morrison introduced Mr. Kendrick as his successor and wished him success, he expressed the opinion that he would fill the position with credit to himself and to the advantage of the Institution. During his year of office, Mr. Kendrick had done more than this; he had increased the usefulness and the power of the Institution by his work, suggestions, and advice, which were to the benefit of the gas industry at large. There was only need to refer to the scheme for the training of gas-fitters. This work alone, apart from everything else, would render Mr. Kendrick's year one of signal success. They were glad to know that, in retiring from the chair of the Manchester Institution, Mr. Kendrick was not ceasing his active interest in its work and that of the gas industry generally, but was to go forward as a member of the Council of the Gas Institution, where the wide experience he had had, and the enthusiasm he had displayed as President of the Manchester Institution, would undoubtedly be of great value.

Mr. SAMUEL GLOVER (St. Helens) seconded the motion, and endorsed all that had been said by the mover as to the work Mr. Kendrick had done during his term of office.

Mr. FRANKLIN THORP, the President of the Manchester and District Junior Gas Association, said he supported the motion, for two reasons. In the first place, it would be the only chance he would have of being able to express publicly the appreciation he had personally of Mr. Kendrick; and, secondly, because he desired to acknowledge, on behalf of the Junior Association, the work Mr. Kendrick had done for them during his year of office. He (Mr. Thorp) occupied a rather peculiar position in the gas world; and on his election to the presidency of the Junior Association, he felt some diffidence in attending the Council meetings of the Manchester Institution. But the kindly way in which Mr. Kendrick, as President, had met him at once banished all his fears, and made him feel "quite at home." The present year had been a critical one for the Junior Association. In the scheme they had taken up with regard to lectures and classes at the Manchester University, they had received every assistance from the seniors; and, on behalf of his Association, he desired to acknowledge this help. If they had met with indifference, or with antagonism, the juniors would have lost a great opportunity. But in place of indifference, they met with great sympathy and help; and in place of antagonism, the seniors had voted them £20, for which they were greatly indebted. Whatever might be the result of the lectures given at the University, and the connection which had been established between the gas industry and that seat of learning, the name of Mr. Kendrick would always be remembered gratefully by those who started the movement. He (Mr. Thorp) also desired to mention, in this connection, the help and advice they had had from Mr. Meunier.

The resolution was then carried with applause.

Mr. KENDRICK, in reply, said that what he had done during his year of office had been "a labour of love" to him, and would not have been possible had he not had the help and support of the Committee, the members of which had really borne the "burden and heat of the day." Therefore the credit for what had been accomplished was as much due to the members of the Committee as to himself.

Mr. WATSON then delivered his

PRESIDENTIAL ADDRESS.

Gentlemen,—I should like to express my warm appreciation of the honour you have conferred upon me by the election to the valued position of President of the Institution. Whatever my power to satisfactorily or otherwise fill the post, I can only say that, realizing "words are but empty thanks," my appreciation carries with it a desire and determination to do all that in me lies to further the interests and maintain the prestige of the Chair and the Institution. The obligation to do so becomes the greater when one remembers that the Institution, notwithstanding its name, is representative of practically all the gas undertakings in Lancashire and Yorkshire, with a few in the adjoining counties, and that its members are responsible for one-fourth of the gas manufactured in the United Kingdom.

POSITION OF THE INSTITUTION AND THE GAS INDUSTRY.

The expression "Manchester District Institution of Gas Engineers" does not adequately serve to indicate the area thus covered, since to those outside the profession the sphere of operations would appear to be limited to Manchester and its immediate vicinity. The Institution, however, dates back to February, 1870, and is the oldest among the English District Gas Associations. The long period of existence (41 years) under the present title would render inadvisable any change of name, and Yorkshire and other towns many miles distant must rest content to be under the ægis of Cottonopolis. The Institution is happily increasing in numerical strength. The roll has reached 176, representing a gain of 10 on the year. This number has, I believe, never been exceeded; and it augurs well for continued success.

While not proposing to make any wide review of the present position of the gas industry, one feels bound to express satisfaction with its continued progress. The industry has from the beginning grown continuously, and can scarcely be said to have had a reverse. In the eighties, when electricity first made commercial progress, the demand for gas still continued, and did so as a consequence of its utility, and not merely from the increase in the country's population. The figures for the last two decadal periods are of interest in this connection.

Year.	Gas Manufactured. Cubic Feet.	Population.	Gas per Person. Cubic Feet.
1889 ..	98,081,283,000 ..	37,178,900 ..	2640
1899 ..	147,155,557,000 ..	40,774,300 ..	3610
1909 ..	193,547,395,000 ..	45,005,800 ..	4300

This progress is the more satisfactory because there have contemporaneously been material advances in methods of using other lighting agents, and therefore increased competition, as, for instance, in the case of electricity. The sale of cheap oil, the easy production of acetylene gas, the development of air-gas processes, and the like, have all tended to act adversely. But these cannot be said to have had any effect—simply finding useful places under definite conditions where gas was unavailable.

LIGHTING.

It has undoubtedly been a very considerable help to progress that by the introduction and evolution of the incandescent burner, the illumination potentiality of gas has been raised from 3½ candles per cubic foot of gas consumed to 30 to 40 candles with the low-pressure and over 60 candles with high-pressure systems. The augmented consumption per person is the more remarkable in view of this great increase in light development, and also the fact that our electric rivals have met with a fair measure of custom up and down the country. One, indeed, wonders to what enormous extent the gas industry would have grown under the earlier conditions and in the absence of electric competition.

HEAT AND POWER.

In the heating field, no great stress has been felt. But in spite of the absence of that stimulative help which competition usually affords, gas fires and radiators are making marked progress in efficiency, and bid fair to materially widen the field for custom. So far as motive power is concerned, more serious rivalry has taken place. In the usage of electric motors, pessimists not so many years back might easily have discovered ground for believing that the gas-engine was to take a very subordinate place in public favour. Time and experience have proved otherwise; and the greatly increased efficiency of the modern internal combustion engine has kept it in considerable prominence. Where electric lighting is desired, not a few firms find it to their financial interest to generate current for themselves by means of a gas-engine driven dynamo; and what gas undertakings lose in direct lighting, they gain in the gas supplied to the engine.

COMPETITION.

Apart from electric motor competition, the gas industry has had threatened reverses in, strange to say, the gas field itself by the

successive advent of pressure and suction producer gas plants. Although the claim for the latter was enough to tempt the town-gas engine user to adopt the suction-gas plant straight away, the natural caution of the ordinary business man saved both his pocket and our custom, and actual experience tended to prove that where capital cost, working expenses, risks, and inconvenience, were all taken into consideration, town gas at a reasonable price was still as cheap as any suction gas on the market.

SMOKELESS FUEL.

Our industry, unlike that of the electrician, covers two branches of business—one dealing with the work of manufacturing and distributing gas, and the other of the sometimes worrying duty of handling, working-up, and finding a market for large quantities of residuals. In the last-named branch, there have been rivals enough and to spare. The search for a good, smokeless substitute for coal for domestic purposes has been vigorous, and the search has brought about the marketing of such commodities as coalite, charco, and other fuels, which have been therefore competitors of our most important residual, coke. The advocates of coalite have spared neither pains nor expense to induce the general usage of that fuel. The difficulties in the way of economic manufacture and distribution have, however, been too great, and we still have, and are likely to have, the field to ourselves.

SULPHATE OF AMMONIA.

The use of coke recovery ovens at collieries has resulted in large quantities of tar and sulphate of ammonia being placed on the market—here, again, threatening, by over-production, the prices obtainable by gas-works tar and sulphate. There appears of late, however, to be no great increase in the number of such plants working in the United Kingdom, nor in the quantity of coal treated for coke production.

FOSTERING LOCAL COKE TRADE.

At the present time, the market for residuals is a good one; and it is difficult to see why, with ordinary care and fostering methods, it should seriously decline. Over the tar and sulphate, we have no direct control; but something can be done with coke. I have on a previous occasion pointed out that, while there are several considerable industrial demands for coke, the most important outlet is in the home district, and that gas undertakings can materially stimulate the sales of this residual, and the prices obtained, by the cultivation of their local trade. Without labouring the subject, I should like to ask members generally not to relax their efforts in this direction. There are still many districts where the supply of domestic or broken coke is not yet undertaken; and enterprise of this kind would not only help the undertaking concerned, but the industry as a whole. The stimulation of the custom must be accompanied by the supply of a good, clean, and dry fuel. The question of moisture in coke is an important one; and it is satisfactory to note that it is receiving wider attention. The apparent sales per ton of coal may suffer; but better realized prices will be the ultimate compensation. Improvements in household grates have been such as to render the combustion of coke a much easier matter; and although people do not readily discard old-fashioned and even wasteful fires, newer houses are not very likely to be so handicapped.

There are, it is true, many useful and certainly efficient combustion stoves on the market; but there is still room for an effective coke-fire for domestic purposes. Some patterns embodying and improving the best features of the French types are to be obtained; but these, though characterized by low consumptions of coke fuel, require more attention in usage than people like to give. I believe that, were it not for the development of the gas-fire and the desire to increase gas sales by its medium, the whole industry would pay some little attention to the question of a good coke-stove, and with successful results. As it is, we have two branches of our business in partial competition, and, naturally, greater thought is bestowed on the more profitable of the two.

COAL QUESTIONS.

If there were one thing more than another which may cause concern, it is the cost of the prime factor, coal. While in the gas industry economies in manufacture and working generally have been effected to such an extent as to permit the price of gas to be continuously reduced in spite of increasing costs of labour and material, there appears to be little immediate hope that the introduction of machinery at collieries will bring about decreased prices. One could hope that the reported savings due to coal-cutting and conveying plant would more than counterbalance the extra cost of winning coal from greater depths and wider underground areas. Coal-cutting machines have not, however, been as yet greatly adopted. The number of such machines was in 1906 some 1136 (252 of these being in Yorkshire); but these only deal with 4 to 5 per cent. of the whole country's output.

The fluctuation in the price of coal during the past few decades has been considerable; but while there have been now and again favourable years for purchasers, the general trend has been distinctly upward. The variation in the price of a commodity upon which the gas industry is so absolutely dependent would be a serious stumbling block to progressive development were it not for the fact that the prices of coke follow, although they do not entirely compensate for, any increase in those of coal, and for the further fact that coal contracts generally begin in one and end in another financial year—thus tending to equalize costs on the year's balance-sheet. Gas managers have every sympathy with collier companies, in view of the difficulties and risks to which they are subjected. Expenses due to increased colliers' wages, to higher prices of material, and to legislative requirements, have, of course, to be met, and should be remembered. At contracting times, however, sympathy frequently becomes a weak feature, perhaps because of the now almost annual suggestions of advances in price. Colliery costs are not so freely given to the world as are, say, gas-manufacturing costs; but such figures as are and can be known are sufficient to suggest disproportion between the advances occasionally asked (as, for instance, the shilling of the early months of last year) and the actual increased costs of working and administration. Gas undertakings are considerable buyers, and collectively take some 15,000,000 tons of coal every year. They pay regularly; and their accounts have seldom, if ever, to be written off the colliery books as bad debts. Some reasonable consideration, therefore, in the absence of abnormal conditions, would appear to be due to the industry when contracts are under discussion.

COLLIERY DEVELOPMENTS.

The enormous development of the coal industry in the South Yorkshire area may have an indirect effect upon prices of coal. The output of coal in the United Kingdom for the year 1909 was nearly 264 million tons; and of this quantity, some 36 million tons were raised in Yorkshire—principally in South Yorkshire. As is generally known, a number of new and well-equipped pits of considerable magnitude have recently been, or shortly will be, started in the latter area, many of them being in the Doncaster neighbourhood. It will not be long before there are 12 or 13 new collieries, each raising some 3000 to 4000 tons of coal per diem. The coal is principally of the steam and house variety, coming from the Barnsley seam; and a good deal of it is being at present sent abroad. So far as gas coal is concerned, the increased market activity may cause older collieries lying to the West to seek fresh ways and means of holding their own, as, for instance, by sinking deeper to the Parkgate and Silkstone gas coals which lie below the Barnsley seam. Some collieries, whether actuated by competition or not, are, as a matter of fact, already doing this, and are thus enabled to place further gas coal supplies on the market.

DONCASTER GAS UNDERTAKING.

I have made allusion to the colliery extensions in the Doncaster district; and it can be understood that these are helping in the development of the gas undertaking controlled by the Doncaster Corporation.

The past two years have been characterized by considerable building activity, due both to the ordinary growth of the town and suburbs, and to the establishment of two or three of the pits within the sphere of Doncaster's influence. It is more than likely that one or two other collieries in the immediate neighbourhood will be added to the number; and these may well be followed by factory developments.

In view of the increasing gas demand, the Gas Committee have during recent years made various alterations to their manufacturing plant. The whole of the retort work was previously done by hand; but this has been displaced successively by manual, and, very recently, by power stoking machinery, with the usual accessories.

The coal is delivered alongside the works by water; and for the purpose of unloading and placing it into the two stores, a self-feeding bucket elevator and steel belt conveyors are employed. The plant was installed in 1905, at a cost of £1955. This sum includes a gas-engine, a 50-feet elevator with 14 feet vertical lift, two 24-inch conveyors, feeding respectively into the north and south coal-stores, an automatic coal-weighing machine, and all the necessary supporting structure. The north store conveyor consists of an inclined section 66 feet long, rising from the elevator shoots and feeding on to the horizontal section, which measures 85 feet in length and is placed in the roof. A similar arrangement exists for the south store. The coal is easily delivered at various points throughout the stores; but the chief feed is at the end of the conveyors opposite, and nearly over the coal breakers and boots belonging to the retort-house elevating plant. In the ordinary way of working no trimming is required, the coal falling by gravitation to the breakers.

It may be of interest to state the power requirements of the plant, which I had carefully tested soon after its installation. Starting with everything clean and lubricated, the data found were as follows:—

Elevator only (50 feet centres)	2·85 B.H.P.
Elevator with north store conveyor (151 feet run)	6·40 ,,
Ditto with average load of coal	8·20 ,,

Based on the present usage of 25,000 tons of coal per annum, the working costs of unloading coal from 75 to 80 ton barges into store or to the retort-house elevator are as under.

Interest at 3½ per cent. on £1955	£73·3	
Sinking fund charge (say 20 years)	72·7	
Renewals, repairs, stores	38·0	
	£184·0 =	1·76d.
Motive power (gas)		0·27
Wages, £278.		2·68
Cost per ton of coal unloaded		4·71d.

Since the above plant was installed, both the coal-stores have been extended and further lengths of conveyor added. These are each 70 feet in length, and are of the swinging or shaking type. The extra lengths, with structure, cost £581; and although

they are only used for storing purposes, an additional charge on the total coal is involved to the extent of 0·41d. per ton for interest and sinking-fund charges. Prior to the adoption of this plant, coal was unloaded by means of half-ton waggons lowered into the barge, filled, and then hoisted by crane on to the gantries running into the retort-house. The method, while effective, cost nearly twice as much as the present system.

The power stoking plant consists of the De Brouwer projector and discharger placed on either side of the retort-bench. These machines have not been long installed. It is, therefore, too early to speak of results. Time was required for the men to get used to the machines. But retort-house working has certainly been facilitated; and the latter, in view of the growing gas output, will prove to be of considerable help. The manual machines have been retained for stand-by purposes; so that shovel charging, which, by the use of machines frequently becomes a lost art, is scarcely likely to be required. In passing, I must say that the manual machines have served their purpose remarkably well; and where power plant is not warranted, I could wish for nothing much better.

The reasons for the adoption of separate power machines instead of a combined stoker are perhaps obvious. In the case of the combination, a breakdown, either of the projector or the discharger, results in the incapacitation of both. In the Doncaster case, any trouble with the one machine simply means bringing into play the manual charger or rake, as the case may be. This is more important where machinery is adopted in a works running only one retort-house, since the whole producing plant can be so easily affected. In a large works, with two or more retort-houses in action, the handicap is of less consequence. A similar disability exists in connection with the adoption of heavy charges during the winter months. With one retort-house, and retorts charged for eight or ten hour work, the breakdown of the discharger on a cold or foggy day is by no means a comfortable thought, if the heavy charge of coke is to be removed by an ordinary rake. For two or three of the winter months, one is obliged, having regard to safety, to fall back on six-hour charges. This difficulty is likely, in many cases, to make chamber-retorts out of the question, unless duplicate discharging machines are in use.

To some extent, the all-round benefits consequent on the continuous use of heavy charges throughout the year are not so easily attainable as in large works. But as there will only be the mid-winter, although most important, months when six-hour work will be advisable, the rest of the year should, judging from experience elsewhere, hold out hope of good results. We have been working eight-hour charges for the past five or six weeks; and there is sufficient justification for the anticipation. The experience now possible with power stoking machinery will be of service to the Gas Committee, not merely pecuniarily, but as helping to determine the nature of further extension, which will probably be necessary next year.

CARBONIZATION QUESTIONS.

Those possessing a diminishing margin of productive power, have at present an interesting problem to solve. Whatever the relative advantages of vertical retorts and horizontals *cum*-power machines, the intrinsic merits or even demerits of either system are not necessarily the deciding factors. What is both useful and economical in one place may not be so in another, and frequently the existing retort-house, the retort-house plant, and its lay-out of stoking machinery and conveyors, are such that a mere addition may be the right policy. On the other hand, considerations of space, relatively decreased holder room, coke sale difficulties, increasing fog possibilities, and the like, may render a carburetted water-gas plant much more economical and useful than either an extended horizontal retort-bench or a vertical retort installation.

PROGRESS OF CARBURETTED WATER GAS.

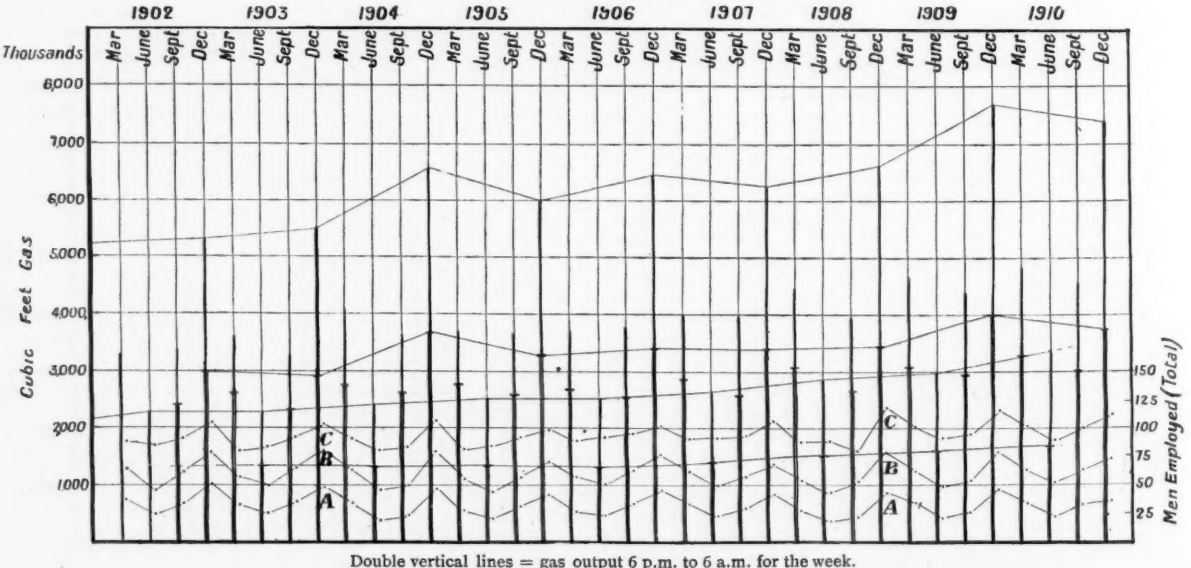
Results from improved methods of coal carbonization might possibly be considered to affect the progress of carburetted water gas. As far as one can gather, however, this does not appear to be the case. The percentage increase in its employment during 1909 compared with 1908 was considerably greater than that of coal gas; and I understand that while during 1910 there was a satisfactory advance in the number of new plants erected, there will this year be a greater increase than has been the case for several years past. Certainly with oil in plenty, a continuance of the present low prices of 2d. to 2¼d. per gallon, and, further, with more or less gradually rising coal prices, there is some reason for the adoption of carburetted water gas. In view of the direct and indirect advantages to be derived, it is sometimes a matter of surprise that these plants are not more freely adopted. The merits of relatively low capital expenditure, the saving of holder storage, the ready availability for peak and sudden loads, the reduced dependence on coal and railway working, and the usage of gas-works coke are all in their favour. A general increase in carburetted water gas production would be an advantage. The displacement of both coal and coke thus caused would represent something in gas industrial economics. Carburetted water gas constitutes only 12¼ per cent. of the whole of the gas made in the United Kingdom; and yet its manufacture lessens gas coal requirements by some 2,100,000 tons a year, and eases the coke market to the extent of over 1,500,000 tons. Many gas undertakings now rely considerably upon their carburetted water-gas plant. The majority are continually using it to the extent of nearly 30 per cent. of their output; some run to 35 and 40 per cent.; and there are a few which exceed the latter percentage. Such annual percentages show that carburetted water-gas plants are not regarded as auxiliaries, but rather as very convenient and handy parts of the whole works plant.

EFFECT OF MACHINERY ON LABOUR.

I have recently been asked for some data as to seasonal fluctuation in employment on gas-works; and in getting out figures, some points arose which induced further investigation, and may possibly be of general interest. In the days of hand stoking, the winter increase of the stoking staff was often considerable and distinctly inconvenient. There was, perhaps, no great difficulty in getting winter hands; but the introduction of more or less untrained men occasionally affected the regular men, and always made working awkward and expensive. With the usage of machinery, the variation in numbers and quality of work became less, and frequently the undertaking's own spare men were sufficient for the extra help required—leaving their less important places in the yard to be filled by extra men. While the retort-house employment is now relatively less, and not so liable to fluctuation, the general conditions of gas practice have altered to such an extent that the fluctuation in the outside and distribution branches tends to become greater, because of the extra work and attention involved—particularly in winter—by the needs of consumers generally.

The accompanying chart shows Doncaster conditions for the past eight or nine years, as indicated by one week taken in March, June, September, and December. During this period, we have changed from hand-stoking successively to manual and power

CHART SHOWING DAY AND NIGHT GAS OUTPUTS AND SEASONAL EMPLOYMENT FLUCTUATION FOR CORRESPONDING WEEKS IN MARCH, JUNE, SEPTEMBER, AND DECEMBER.



Double vertical lines = gas output 6 p.m. to 6 a.m. for the week.
Single do. do. = ,, ,, 6 a.m. ,, 6 p.m. ,, ,,

A—Retort-house staff. B—Purification and general work. C—Distribution.

Manual stoking machinery installed 1903. Coal-conveying plant installed 1905. Coke-conveyor installed 1905. Power stoking machines installed 1910.

stoking machinery, and added coal and coke handling plant. Something of the effect is shown by the retort-house employment curve (A), which, of course, must be considered in relation to the increasing gas outputs. The extent of general yard employment (curve B) has altered from time to time with the size of and consequent work in dealing with the coke stocks. It will be seen that the distribution employment line (C) varies a good deal; this being dependent on the extent of main and service renewals and other work on hand at the periods indicated.

The chart incidentally affords satisfactory proof that the total day loads for the week are gradually approximating in extent to those of the night, and, further, that the summer daily loads are growing at a faster rate than the winter loads, both of which changes make for saving of capital and work. It is interesting to note that while cookers and engine demand have materially increased the day load during the summer, the requirements for gas fires and radiators, in addition to any cookers and engines in use, appear to have a good effect in the same direction during the winter.

DISTRICT WORK.

The increased attention paid to district work is becoming a feature of present-day gas practice. The development and varied application of the bunsen burner in connection with both low and high pressure lighting and with all forms of heating, have brought about altered conditions. Where once a consumer had burners, fires, and other apparatus simple in construction, but for satisfactory effect dependent upon extravagant usage of gas, he now has appliances which, made for economy and efficiency, require careful and skilled manipulation to procure these results. The changed conditions have neither been understood nor recognized by the majority of gas users. As things are at present, perhaps, the average consumer can scarcely be expected to appreciate the fact that the wrong selection and application of gas appliances and pipes may cause considerable dissatisfaction at a time of day when very effective gas lighting and heating are really at his command. The usage of gas implies skilled fitting and intelligent care, much of which are beyond the scope and time of most consumers, and, indeed, beyond the power of many men who, used to rough pipe work, consider they are fit for the work, and get themselves employed as gas-fitters.

Only the other day, a representative of a firm of lighting appliances called upon me to demonstrate the advantage of a certain incandescent burner which could be adapted to any gas and any pressure. Its adaptation, however, necessitated his carrying a case containing thirty different nipples, and almost as many air cones in order to suit the burner exactly to the conditions of its particular usage. My unexpressed thought on seeing the demonstration was one of commiseration for the average town fitter who undertook, with such a series of possible combinations, to fit that burner. Perhaps one's pity should be reserved for the gas undertaking whose gas, by careless adaptation, was likely to be maltreated.

TRAINING OF FITTERS, ETC.

It has been pointed out again and again that the requirements of modern gas lighting and heating practice are not covered by the training of the ordinary town plumber and fitter—certainly not that exemplified by the plumbing and fitting syllabus of the City and Guilds of London Institute. It is not my intention, however, to weary you with any restatement of the case in favour of the systematic training of gas-fitters. We are all agreed that the grave lack of adequate knowledge and manipulative skill on the part of many fitters having in their hands the development of light and heat from gas, constitutes a serious menace to our industry. My predecessor, Mr. Kendrick, has fully and ably dealt with this question. He has proved his earnestness in the matter by endeavouring to enlist the practical sympathy and help of the various Fitting and Plumbing Associations concerned, and further shown the possibilities of educational work on the lines proposed by undertaking, with some success, a series of lectures on gas-fitting at Salford—the example being followed in several other towns. The endeavour to stimulate the interest and effective assistance of the Plumbers' Associations so far as concerns the establishment of training centres and adequate examinations, has not been fruitful. They would appear slow to move; but there is now good hope that the Ironmongers' Federated Association and the Birmingham Gas-Fitters' Association will fall in with the suggestions made. Their co-operation in work which is for the common good will be welcome and appreciated.

The warm thanks of the gas industry as well as of this Institution are due to Mr. Kendrick for the work he has done; and we all trust that the movement thus started will lead to the evolution of well-trained and certified gas-fitters up and down the country. At the same time, while this may be a consummation devoutly to be wished, it has to be remembered that the public is accustomed to call in the "plumber" for gas-fitting as well as for the ordinary sanitary pipe work; and it will be long before the average householder will trouble to ask whether he be "qualified" for the former work. The "plumber," as such, will, therefore, still remain as a factor in matters of gas usage, and has to be reckoned with. In view of this fact, it is much to be hoped that the Advisory Committee on Plumbing to the City and Guilds of London Institute may be induced to give greater attention in their syllabus to the several phases of modern gas-fitting. At present, the knowledge required for examination purposes is only of pipe work as applied to hot and cold water supplies and the like, and this simply in the Ordinary Grade. The only other reference to gas-fitting is very brief, and is concerned with the "movement of air or gas through pipes, as in the distribution of coal gas."

The subject is the more important because the position of the gas industry is different from that of any other public service. Gas, unlike (say) water or electricity, is a complex body. The development of light, heat, and power by its means takes place in two almost equally important stages—one being the manufacture at the works and the other the accurate admixture with the necessary component, atmospheric oxygen, on the consumer's premises. This being the case, it should not be left to the chance mercy of incompetent individuals. It seems, indeed, an anomalous state of things that the control of a commodity so absolutely dependent for efficiency upon correct usage should be allowed at all to be in the hands of two different classes of people.

GAS CONTROL TO THE POINT OF IGNITION.

The solution of the whole problem would appear to be statutory supervision by all gas undertakings without exception of the gas right up to the point of ignition; the suppliers thus completing the process of furnishing light and heat, which is the real purpose of their existence. Such control does not necessarily imply the performance of purely fitting work; but it obviously carries the right to impose a specification of requirements as to the size, the fitting, and the use of pipes and gas appliances, and the certification of the work before gas is supplied. A clause of this nature in all gas legislation would be much more to the point than the present futile stipulation as to the maintenance in street mains of the inadequate 6-10ths and 8-10ths pressure. The necessity of certification of work would very soon settle the difficulty as to the employment of unqualified fitters. I am inclined to think that some such control will become an increasingly essential one. There are, unfortunately, large numbers of cheap and inferior burners, lamps, and other fittings on the market; and these are being freely bought by inexperienced gas consumers. The poor quality and defective workmanship can only mean that such appliances will have short lives as effective light and heat agents, with the usual unearned result of discredit and anathemas for the gas undertaking.

Even with the best fittings procurable, trouble can easily occur if the house piping be inadequately done. Only three weeks ago my attention was called to a small house in process of construction where the plumber's ideas were represented by a ½-inch rising pipe reduced to ⅜-inch, from which two ¼-inch branches were taken, one of which had to serve two lights and a boiling ring, with some of the piping fastened like festoons to the joists. Such piping and (say) incandescent burners, obtained as they can be complete with mantle, fork, and glass at 6½d., do not produce a contented gas consumer. If any anathematization is to be done, the executants should be the gas suppliers.

Some species of control is already exercised by the gas companies who undertake free or partial maintenance; but the practice is not universal. In the case of most corporation gas undertakings, there is little, if any, supervision; and the suggestion, still less adoption, of the method without statutory power seems hopeless in view of municipal trading opposition. Anything done on the consumer's side of the meter in the way of supervision or work is objected to by some ironmongers and fitters. While one is bound to sympathize with the feeling, the interests of the gas undertakings render almost imperative the duty of supervision, with free attention to consumers' appliances, whatever may be decided as to the supply of the latter. Systematic advice and help given in this way may well lead to increased business for both gas suppliers and fitters, and the real interference with the town fitting trade need not necessarily be great.

One feels that the co-operation of ironmongers and fitters with gas undertakings in a matter such as the practical education and better training of their workmen, is calculated to lead to mutually satisfactory arrangements so far as trading competition is concerned, and, therefore, better business relationships.

PUBLICITY COMMITTEE AND EDUCATION OF GAS USERS.

Whatever may be done in these matters, our next duty will be to educate the consumers and the public generally as to the requirements of modern gas practice, and to make them realize, if possible, that economical and efficient gas usage necessitates the employment of competent and qualified fitters. The education of the gas-using public is a distinct necessity; and when once the Gas Publicity Committee gets established, as we hope will be the case, its operations in bringing the public up to date, as it were, in a knowledge of the right usage of gas will certainly be very valuable.

The possibilities of a National Publicity Committee such as has been constituted, are considerable; and it will be the wish of every member of the gas profession to see the proposed scheme carried through. There is still a good margin for increased gas custom in every town; and whether the gas undertaking belongs to a company or a municipality, it is a custom which must be cultivated. General interest is being paid to town-planning, smoke abatement, and other improvement matters; and with the establishment at this juncture of a Committee devoted to propaganda work, means will be provided for directing public attention to the possibilities of gas for many of the purposes (and not the least of which will be in the reduction of the smoke nuisance) involved by the schemes under consideration. The need of the Publicity Committee is great; and, to quote from the Lancashire Commercial Section report, "it is earnestly hoped the scheme will receive the generous

support of all the gas undertakings in the United Kingdom (both corporation and company)."

ILLUMINATION.

Enhanced interest has, during the past few years, been exhibited in illumination matters generally. The development of light sources has keenly excited the attention of both physicists and lighting experts; and the general importance of this branch of work has brought into existence Illuminating Engineering Societies in the United States of America and in England, with magazines exclusively devoted to the subject. The further outlets thus provided for the opinions of those engaged in illumination work have resulted in a great number of excellent papers and discussions well worth consideration. It is impossible, however, to read many of these without a feeling that, apart from actual practice, there are several difficulties which require settlement. It is only necessary to refer to those resulting from the international usage of two standard candles, to the varied employment of photometrical quantities and terms, and to differences in the rating of light sources. Happily, America, France, and Great Britain are agreed as to the common value of what is now known as the "international candle;" but the variance between this standard and the Hefner candle of Germany is too great to hope for the abandonment of the one or the approximation of both. The determination, of the definite ratio of the international candle = 1·11 Hefners is of practical service. The trouble, however, is that we occasionally get contributions in which the derivatives are expressed in hybrid language. It is only a short time back that a conversion table was published; and a reference to the terms used will be sufficient for the purpose of illustration. Hefner metres, Hefner feet, candle feet, candle metres, carcel metres, and bougie metres will contribute variety enough for most people.

The difficulty is not perhaps so much in using varying terms, which, after all, are comprehensible, as in the reference to primary standards without defining those used. There have, for example, been not a few cases where results of lamps and burners based on Hefner candles have been published without correction, and being easily read as English data, are to that extent misleading. This possibility has been taken advantage of by some fitting and lamp firms, as is shown by their advertisements. There has been considerable importation of lamps and burners; and some of these, by their excellence, may have done good in stimulating our own manufacturers. Many of them are, however, credited with greater merit than they possess, in consequence of the difference existing between the German and English standard of valuation.

While it is not within our province to speak of foreign competition, one does feel that a strong protest is needed against the occasional practice of marketing lamps in England as yielding so many (presumably English) candles when the rating has been done in Hefners. Advertisements are not often instructive on matters of this sort. It is seldom, for instance, that the candle power is published with particulars of the angle at which the value was obtained. The omission is not material, since the ordinary lighting expert, knowing the general polar characteristics of the various lamps on the market, is usually cognisant of the direction of the maximum lighting rays. Still, in view of the varied shapes and uses of reflectors, the information would be useful. The pressure at which the stated value was obtained is rarely given, and the absence of such information has led to frequent disappointment, when burners probably tested at 3 to 4 inches have been applied to domestic conditions where such pressures are unavailable. Notwithstanding the now general increase in district main pressures, there are many local cases where, through distance from the works governor, or small mains, or more frequently inadequate service pipes and fittings, the necessary pressure to ensure good results cannot be obtained.

Speaking generally of the candle power rating of lamps and light sources, while difference of opinion exists, there has been during recent years a tendency on the part of some lighting experts to express the value of lamps in terms either of mean spherical or mean hemispherical intensity, in order to take into computation every light ray in whatever direction emitted. It is assumed that reflectors or other adventitious aids can, or should, be made to bring the whole of the available light into useful work.

To my mind, only in a few cases does the M.S.I. or the M.H.S.I. method express the practical value of light sources. Lamps are selected and used for specific purposes; and they are best judged by the light rays which suit the end in view. Take, for instance, the comparative examples of street and room illumination. In the one case, rays slightly depressed from the horizontal are the most useful; while in the other, most of the light is required in a downward direction. In neither instance does the spherical or hemispherical expression (which may be unduly inflated by any of the rays) indicate the value of the lamp for the purpose desired. It is easily possible, as polar diagrams show, to have two burners with nearly similar M.H.S.I. ratings of 56-candle power and 54-candle power yet yielding respectively 77 and 53 candles on the horizontal line, 51 and 53 at the 45° south angle, and 00 and 52 at the 90° south angle. And this fact is almost sufficient to prove the inadequacy of the rating, and the advisability of computing the value of a light source on a basis which has reference to the conditions of usage.

The M.H.S.I. method seems to have found favour with the originators of the Westminster lighting contract. The basic principle underlying the specification (which has been admirably drawn up) is a good one, inasmuch as it asks for a definite supply of light *per se*, and irrespective of the nature of the source—thus leaving the suppliers some latitude as to the latter. The light furnished is judged by the M.H.S.I. of the lamp; the average of the 20° and 50° south rays being taken as representing this value. So far as the Westminster conditions are concerned, the method, perhaps, is a satisfactory one. Most of the thoroughfares are of considerable consequence, and require more than moderate lighting. The lamps are, therefore, placed sufficiently close together to get comparatively equable lighting; and under these conditions the lighting rays between the 20° and 50° south angle are probably of the greater importance.

The Westminster contract has caused a good deal of interest, not only among lighting practitioners, but among town councillors and others responsible for street-lighting up and down the country, and I have found here and there a tendency to consider the specification some sort of guide and precedent in districts not comparable with Westminster. The adoption by public authorities of the standard—that is to say, the M.L.H.S. value—without regard to circumstances, is an undesirable possibility. The spacing of street lamps in many provincial towns is greater than is the case in important cities like Westminster; and the selection of a test which appraises the lighting rays emitted below 20° south angle and disregards those lying between that angle and the horizontal line, is likely to cause disappointment. One can easily imagine the patchy effect, for instance, between columns which are 120 feet, 150 feet, or even a greater number of feet apart. The undesirability of the standard under the latter conditions is best indicated by the following data derived from some polar diagram and tables, which I have taken the liberty of extracting from Mr. J. Abady's valuable Institution paper. The data are not intended to prove the merit or demerit of any particular light source, but rather to show how a lamp may possess the required, or even a greater, M.H.S.I. value, and yet be inadequate for a given purpose.

Single-Burner Lamps.

Height 11 Feet above Ground Level.

Angle.	Distance from Column.	No. 4 Kern Burner.		Inverted Burner.	
		Candle Power.	Foot Candle Value at Ground Level.	Candle Power.	Foot Candle Value at Ground Level.
S.	Feet.		Approx.		Approx.
10°	62·3	122	0·034	90	0·022
20°	30·2	98	0·095	90	0·087
30°	19·0	102	0·211	83	0·172
40°	13·1	100	0·342	81	0·277
50°	9·3	87	0·422	84	0·408
Average of 20° and 50° rays, and of foot-candle values		93	0·258	87	0·247
Compare (say) 10° ray .		122	0·034	90	0·022

Three-Light Lamps.

Height 15 Feet above Ground Level.

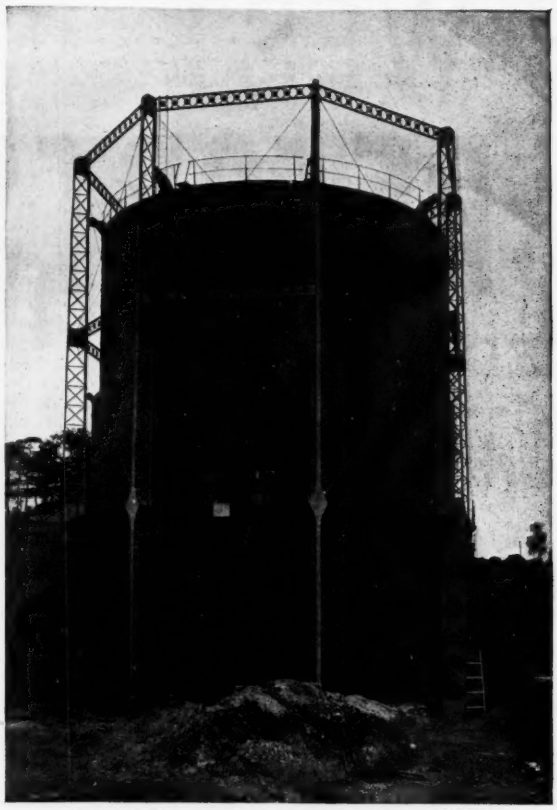
Angle.	Distance from Column.	Three Inverted Burners.		Three Metallic Filament Bulbs.	
		Candle Power.	Foot Candle Value.	Candle Power.	Foot Candle Value.
S.	Feet.		Approx.		Approx.
10°	85·0	520	0·070	480	0·064
20°	41·2	430	0·224	410	0 214
30°	25·9	350	0·389	380	0·422
40°	17·8	335	0·620	380	0·700
50°	12·6	320	0·835	370	0·966
Average of 20° and 50° rays, and of foot-candle values		375	0·529	390	0·590
Compare (say) 10° ray .		520	0·070	480	0·064

High-Power Lamps.

Height 20 Feet above Ground Level.

Angle.	Distance rom Column.	8 Amp. Flame Arc. (Old Pattern.)		H.P. Upright Gas-Burner.	
		Candle Power.	Foot Candle Value.	Candle Power.	Foot Candle Value.
	Feet.		Approx.		Approx.
10°	113·4	770	0·058	1600	0·12
20°	55·0	1120	0·327	1460	0·42
30°	34·6	1530	0·960	1110	0·70
40°	23·8	1820	1·880	930	0·96
50°	16·8	1750	2·570	920	1·35
Average of 20° and 50° rays, and of foot-candle values		1435	1·45	1193	0·89
Compare 10° ray . . .		770	0·058	1600	0·12

If it is assumed that with the contrasted lamps the spacing is such that the 10° lighting ray strikes the ground midway between



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709, OLD KENT ROAD, LONDON, S.E.

Telegraphic Address: "METROGAS, LONDON."

GLOVER-WEST
VERTICAL RETORTS

ADOPTED IN

ENGLAND, SCOTLAND, IRELAND,
AUSTRALIA, JAPAN,
AND UNITED STATES OF AMERICA

AS FOLLOWS:—

ST. HELENS (First Installation),
MANCHESTER,
ST. HELENS (Second Installation),
ROCHDALE,
BRADFORD,
HELENSBURGH,
LURGAN,
TOKIO,
SYDNEY,
FITCHBURG.

WEST'S GAS IMPROVEMENT CO., LTD.,

ENGINEERS,
MILES PLATTING, MANCHESTER.

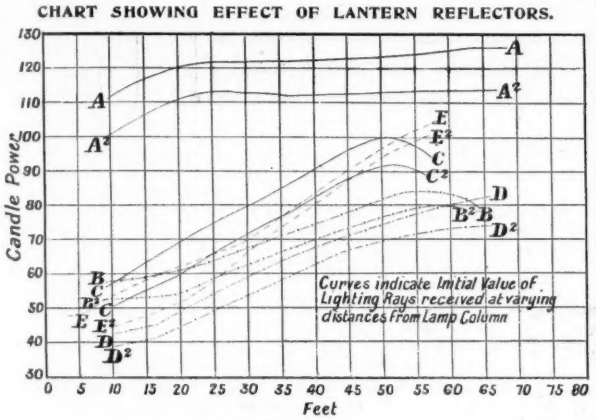
the columns, it will be seen that the foot-candle illuminations at this point are seriously different, although the lamps, judged by their M.H.S. value, may comply with the specification. The differences are much more accentuated if the lamps are wider apart, as they frequently are in the less important streets. As there is usually more than sufficient light near the column, it becomes a question whether, for linear lighting, the 10° south ray, or (say) the average of the 5° and 15° rays, is not a more suitable criterion for the purpose in view.

It is interesting to note that the Illuminating Engineering Society have recently decided to appoint a Committee, with power to consult with others, for the purpose of drawing up, in preliminary form, a suggestive specification for street illumination. The Institution of Gas Engineers should be well represented on this body, not merely to watch the interests of our industry, but because of the fact that street lighting through the United Kingdom is principally—I was going to say almost wholly—done by gas.

The deliberation of the suggested Committee will be followed with interest; and if as a result defined standards to suit particular conditions are agreed to, makers will be in a position to pay closer attention to the design of lamps, and particularly of reflectors, with a view to getting good distributive effects. There is ample room for improvement in the latter respect; for in some instances lanterns seem to be made and fitted without any particular photometric test, and the reflective effect is quite a matter of assumption.

As time has allowed, tests have been made of a few comparatively modern lamps; and the results are submitted on the accompanying chart for the purpose of showing that at any rate some lanterns on the market to-day are susceptible of improvement. The candle power rather than the foot-candle values have been plotted out, since the resultant curves more clearly indicate the

CHART SHOWING EFFECT OF LANTERN REFLECTORS.



Note: Single-burner lamps, 11 feet high.

A.—Cylindrical lantern, convex reflector 1 inch deep, inverted mantle 1½ inches lower than reflector.
B.—Square lantern, convex reflector 1 inch deep, inverted mantle 2½ inches lower than reflector.
C.—Square lantern, convex reflector 1 inch deep, upright mantle 3 inches lower than reflector.
D.—Square lantern, experimental inverted 3-inch pyramidal reflector, upright mantle 3 inches lower than reflector.
E.—Square lantern, almost flat reflector, upright mantle, 3 inches lower than reflector.

Note: The letters numbered "2" are same lamps without reflector.

increased light due to reflecting devices. It is proposed to let the diagram speak for itself; but I would just direct attention to one or two points. Curves A and B indicate the differences which, through construction, may occur between two single inverted gas-burner lamps, although used under almost similar conditions as to pressure and gas consumption. The A lines are satisfactory as suggesting the distribution possibilities of an inverted burner with lantern and reflector of careful design. The disadvantages of a relatively flat reflector are shown by curve E; while the lantern D, fitted experimentally with a deep pyramidal reflector, suggests the possibility of still further increasing the value of the nearly horizontal rays.

The enterprise of the Illuminating Engineering Society, through either its Lighting Specification Committee or its ordinary members, may indirectly tend to suggest some lines which makers will be glad to work to—much as the Heating and Fire-Goods Research Committees in more direct ways have helped to point out the direction in which gas-fires and retorts respectively can be improved. It will be readily granted that the *rapprochement*, or tendency to co-operation, which is taking place at the present day between makers and our industry, is likely to be of distinct mutual service; and, therefore, for this reason, I think, among recent movements, the establishment of the Society of British Gas Industries is not the least important. The existence of this body may be a good thing in itself; but it certainly provides a convenient and welcome medium for collaboration in thought and work. Joint Committees constituted from that Society and the Institution of Gas Engineers working on neutral ground, and sharing their knowledge and experience, are calculated to do immense service to all makers of gas appliances, gas undertakings, and the gas-using public alike; and the work already done in the way of such deliberation augurs well for the future.

Looking round generally at every phase of the gas industry, there would appear to be signs, not only of present progress in manufacturing and distribution matters, but also of a long continued and prosperous future.

Thanks to the President.

Mr. Charles Wood moved a vote of thanks to the President for his address. He said he considered Mr. Watson's remarks on street lighting were of great importance to the members, especially to those who were faced with the keen competition of electrical undertakings.

Mr. Brearley, in seconding the motion, observed that in twenty years from now Doncaster would be a very different place from what it was at present; for the new collieries to which the President had referred would undoubtedly create a revolution in that part of Yorkshire.

The resolution having been carried,

The President briefly responded.

Some Methods of Increasing Output.

Mr. E. H. Hudson (Normanton) then submitted a paper, entitled: "Ideas, Old and New: Some Methods of Increasing Output." It will be found, with a report of the discussion upon it, on p. 600.

Votes of Thanks.

Mr. Ball moved a vote of thanks to the Gas Committee of the Manchester Corporation, and to Mr. Newbigging, their Engineer, for having given the members an opportunity of inspecting the installation of Glover-West vertical retorts at the Droylsden Gas-Works.

Mr. Morrison, in seconding the motion, said the members were indebted to the Corporation for many courtesies. He added that in Mr. Newbigging they had a most capable and efficient gas engineer, of whom they were undoubtedly proud. He (Mr. Morrison) was satisfied that as long as the Gas Committee of the Corporation gave Mr. Newbigging a reasonably free hand, Manchester would be to the front as to its gas undertaking.

The resolution having been carried,

Mr. Newbigging replied. He said that it had given him great pleasure, with the consent of his Committee, to afford the members of the Institution an opportunity of inspecting the vertical retorts at Droylsden. Were it not for the fact that he was to give, on a future occasion, and in another place, the results of his experience of these retorts, he would willingly have presented them to the members. This he would say now, however, that he was convinced that the carbonization of coal in vertical retorts on the continuous principle was destined to be more and more important to the gas industry in the future. In conclusion, he remarked that, if any member desired to inspect the installation more thoroughly than had been possible that day, he should be pleased to afford all the facilities he could for doing so.

On the motion of Mr. Whatmough, seconded by Mr. Kendrick, a vote of thanks was passed to the Chairman of the Manchester Corporation Tramways Committee, for having placed special cars at the disposal of the members for the visit to Droylsden.

Mr. Harry Townsend (Wakefield) moved a vote of thanks to the officials of the Institution for their services during the past year; making more especial reference to Mr. Whatmough, the Hon. Secretary, and the Hon. Treasurer, Mr. Thomas Newbigging.

Mr. E. J. Wellens (Hebden Bridge) seconded the motion; and, it having been supported by Mr. Kendrick, it was carried by acclamation.

With Mr. Whatmough's response, the business meeting was brought to a close.

Tea and President's Reception.

Subsequently the members had tea together; and later the newly-elected President held the usual reception.

Development of the Gas-Engine.

At an extra meeting of the Birmingham Association of Mechanical Engineers a few days ago, Professor F. W. Burstall delivered an address on "The Modern Development of Large Gas-Engines." He reviewed the situation as it existed soon after the expiration of the Otto patent in 1890, at which time, he said, practically all the gas-engines were of quite moderate powers, not much exceeding 40 H.P. With the introduction of the anthracite producer for making power gas, and later the Mond gas process, there came about a demand for engines of greater power than those which had been previously contemplated. Discussing the difficulties encountered in the large gas-engine as against the small one, Professor Burstall said there was no better example in the whole of engineering practice of the fallacy of designing large and small machines on similar lines than was to be found in considering the development of the large gas-engine. The type of engine which was so successfully worked out by Crossleys and their German partners, when extended to larger powers was found to develop faults altogether absent from the smaller engines. Professor Burstall went on to describe the best known of the German gas-engines, made by the Nurnberg Company, who, he said, had evolved what must undoubtedly be considered the best large gas-engine that existed at the present time.

IDEAS, OLD AND NEW:

SOME METHODS OF INCREASING OUTPUT.

By E. H. Hudson, of Normanton.

[A Paper presented to the Manchester District Institution of Gas Engineers, Feb. 25.]

This Institution has for some time past been supplied with the latest information on carbonizing, and the advocates of the vertical retort systems are actuated with a desire to produce gas at the lowest possible cost. I therefore wish to engage the attention of the members on this occasion with the selling of the gas when produced. While the former subject at the present time is, by virtue of the high unit in production, restricted to the larger undertakings, my subject applies to the undertaking of every member. I am therefore, in the words of our late friend Mr. William Carr, a seeker after truth, and have brought the matter before you in the hope that it will be an introduction for a free and candid expression of opinion.

Most of us remember when gas supply was a monopoly, and the conditions surrounding that monopoly were in some respects arbitrary, and were not conducive to obtaining the best results. Hence the advent of opposition has stimulated enterprise both in the method of production and in the conduct of the business generally. I think the maxim of the old days was the payment of maximum dividends by the exercise of the least possible exertion; and in attaining this desideratum, conditions were in vogue which could not obtain to-day. Charges were made for the service from the main, large deposits against accounts demanded, the payment of previous tenants' gas bills enforced, and an absolute indifference as to the result obtained by the consumer for the commodity paid for. This apathy stultified invention and practically restricted the use of gas for illuminating purposes. Happily, competition and general progress have removed these anomalies; and to-day we are actuated by a desire to obtain from that valuable mineral, coal, the utmost it will produce, and to encourage the use of the products in the best and most successful manner. And to assist us in our efforts, inventive minds have constantly brought to our notice new apparatus connected with industry and domestic life.

There was, in the old days, a strong prejudice against the use of gas for any other purpose than lighting, in consequence of the deleterious effect gas had on the atmosphere of a room. In spite, however, of the progress made in purification and the improvements of burners, this prejudice remained; and it has only been by the indomitable perseverance of the members of our profession and those engaged in research work that these prejudices have been overcome. A great section of the public has now been reconciled to this fact; and the situation presented to us now is that we are possessed of a lighting agent, a fuel, and a source of power in its healthiest and cheapest form. Nevertheless, while gas has been making progress, other sources of light and power have been making similar progress, and there are very few centres in which there are not two sources of supply—breaking down the monopoly of old days and placing us in the position of having to sell our commodity, as against the old days of supplying it.

This brings me then to the purport of my paper, and to the methods adopted with success by the Company I have the honour to serve.

Maintenance.

In the first place, it is necessary to have in the district men fixing and maintaining gas apparatus who are thoroughly conversant with the business. Therefore, it is incumbent to have men in our own service who can put in an installation of any kind so as to give the very best possible results. With the staff under control and efficient, I considered it advisable to undertake the maintenance of burners; and after considering the various systems in vogue at other works, I resolved to present a scheme to our consumers which could not be looked upon with any degree of suspicion. It is simply this, to clean and regulate burners free, and to charge the proper trade price for all materials used; and I have found that the profits on the materials used have slightly exceeded the cost of the fitter's time. The fitters are supplied with books on the manifold principle (a copy of a leaf from which is shown), so that on completion of the job an account is rendered, the correctness of which is acknowledged by the party for whom the work has been done.

Slot Installations.

Normanton being a residential district with a mining population, our consumers consist of working people; and the only method of supplying this class is under the slot-meter system. Of late years, our expansion has been chiefly in this direction; and when I say that we are prepared to pipe the lower rooms of a house, fix gas-fittings at four points, and a cooker, it will convey some idea that we have not minced matters to secure business. I have noticed in some returns the smallness of the extra charge for slot-meters; but I find that, with an average consumption of 7500 cubic feet per meter, 10d. is little enough to charge in excess of the ordinary rate. My experience in connection with slot installations has been that the extra expenditure of a stove, which for some time we were very reluctant to introduce, has proved to be the best paying part of the installation. Now, if a judicious expenditure in providing appliances for the consumption of gas with slot installations is beneficial, does it not suggest that there is field for expansion with the ordinary consumer in providing apparatus for consuming gas, on a lower scale than at present exists? I am of opinion that the answer is in the affirmative; and acting on this conviction, I recommended my Company to let out gas-fires free of all charges.

NORMANTON GAS COMPANY.

No.____

Maintenance Account (Credit).

_____ 191

*Mr.*_____

Goods Supplied:—

Burners_____
,, _____
,, _____
Mantles_____
,, _____
,, _____
Chimneys_____
,, _____
Globes_____
,, _____
Sundries_____
,, _____
,, _____
,, _____
,, _____

Attendants' time_____hours—FREE.

Goods supplied and work done to satisfaction of_____

_____ *Maintenance Attendant.*

This Amount will be charged for on Gas Account.

Free Gas-Fires.

Such a course requires justification; and I justify the action in the following way. In our efforts to secure business we should not hesitate to lay gas-mains, connect service-pipes, and put in slot installations at an average cost per consumer of £6 for an average consumption of 7500 cubic feet per annum, then why should we hesitate to lay out a sum of 30s. or 35s., if needs be, for an average consumption of 10,000 cubic feet? It might be argued that the hire system would meet the case with respect to all gas appliances; but my experience with respect to fires in particular is that there is no gain, or very little gain, in regard to hire charges, because of the fact that after a winter's use, to save the summer hire, or else to get a new fire, a consumer will send in the fire, and even if a fixing charge be made, will willingly pay this small item. I am led to think, from inquiries often made, that, till quite recently, most companies refused to supply a gas-fire on any terms but purchase. How one can expect to develop on these lines is beyond my comprehension, because of the difficulty of the consumer selling the fire in case he ceases to use it.

Yet it must be admitted that gaseous fuel is practically a great unexplored field; and it rests with us to introduce a system to influence the public in its favour. The first step, in my opinion, is to convince the public that what we recommend to them is the right and proper thing. Are you going to accomplish this by answering their first inquiry by saying they must purchase the fire outright, otherwise it is denied them? A reply of this kind must suggest a doubt in their minds as to our confidence in the efficacy of the fire. Fully convinced this was the first move, we launched a scheme, and now undertake to fix a fire in any room in regular use free of cost. We take particular care that the consumer is made thoroughly conversant with the cost per hour which the stove or fire will run him into, and to obtain some idea as to the time it is likely to be used. From this it will be seen that the consumer knows quite well what the stove or fire will cost him, and it also enables us to ascertain whether the fire is for regular use or a temporary makeshift.

My remarks apply particularly to the domestic consumer and shop premises; but, of course, with a business which justified large stocks, even public halls might be taken up without much risk—first obtaining some guarantee that there would be some adequate return by use, or payment in case of default. I have now had considerable experience with the system, extending over two years; and considering that our area is distinctly a working-class district, and that the bulk of our consumers are connected in some way or other with collieries, and obtain fuel at cheap rates, we have a considerable number of gas-fires in use, and the results have been highly satisfactory. The returns have been low,

averaging 7 per cent. The following table will clearly show that, financially, the system has been a huge success.

	Total Cost.	Yearly Consumption.		Increased Consumption.
		Before.	After.	
	£ s. d.	Cubic Feet.	Cubic Feet.	Cubic Feet.
No. 1 gas-fire . .	0 17 5	13,000	15,200	2,200
,, 2 ,, . .	0 18 1	25,600	32,100	6,500
,, 2 ,, . .	0 18 8	11,200	26,800	15,600
,, 4 ,, . .	1 6 1	44,800	49,300	4,500
,, 5 ,, . .	0 17 6	12,900	25,300	12,400
,, 6 ,, . .	2 14 10	16,100	36,300	20,200
,, 7 ,, . .	0 18 1	0,000	5,700	5,700
,, 8 radiator . .	2 13 0	41,300	51,300	10,000
,, 9 ,, . .	2 13 3	19,900	29,500	9,600
,, 10 ,, . .	4 2 3	10,000	27,800	17,800
	17 19 4	194,800	299,300	104,500

Total cost of fires, &c., £17 19s. 4d.
Total increased consumption, 104,500 c. ft., or 53 per cent.
Cost of gas at 1s. 3d. per 1000 cubic feet £6 10 7
20 per cent. depreciation and charges on £17 19s. 4d. 3 11 10
£10 2 5

Increased consumption, 104,500 c. ft. at 3s., £15 13s. 6d.
Net gain, £5 11s. 1d., or 30 per cent. on cost.

This table shows that, after providing for maintenance and renewals, there is an increased consumption of 53 per cent. where fires were supplied, and a profit equal to 30 per cent. on the outlay. One of the chief objections which will no doubt be raised is the constant change of design of gas-fires. But we have reached a time now when we can look forward to a period of rest; and makers themselves are realizing the fact that parts must be interchangeable, and that improvements must be so designed as to be applicable to existing fires.

The importance of this question cannot be better emphasized than by quoting the words of Professor W. H. Watkinson, in discussing the paper read by Mr. H. J. Yates before the Liverpool Engineering Society,* when he said:

In regard to gas-fires for domestic purposes, so far as newly-erected houses, and houses owned by the occupier were concerned, nothing better could be desired than the admirable gas-fires referred to; but for the million who live in the existing houses fitted with coal-ranges, the difficulty was the initial cost of the plant. While the cost of a gas-fire installation remained at £5, £6, or £7, it was a bar to the wholesale use of these fires. He was unable to understand from his study of the question why gas-fires should not be supplied by gas companies at 10s. or £1. If this came about, where one gas-fire was now found there would be 1000 in use; and in this way the smoke nuisance would be obviated to a very great extent.

Differential Rating.

Now, as is well known, there have been many schemes introduced to increase the day load. I have heard it argued that if gas costs 9d. into the holder, any business in the shape of power, heating, and cooking above this cost price is justifiable. But I must candidly admit that I am not one of that school. I consider that we should not saddle one class of consumer with all the standing charges, but in fixing a rate at which we can sell gas at a profit, we should take the net price of the gas, including all charges, as the basis upon which to work; and, further, that differential rates should be given by concession to large consumers, irrespective of the way in which the gas is consumed. Yet there is a tremendous field open for gaseous fuel; and as consumers for this purpose would not necessarily participate in any differential rate, it becomes an important question whether or not to make exception in this direction and sell gas for this purpose at a very low, but remunerative, price, and so put us in possession of business the magnitude of which one cannot assume.

In consequence of its cleanliness, the removal of prejudice as to its hygienic effect, and the influence on public health by the amelioration of the atmosphere of towns, gas-fires are rapidly coming more and more in public favour, and, albeit, under many circumstances it compares favourably with other forms of heating. But for it to be universally used, we shall have to supply our commodity at a price which will, under every consideration, compare in cost with coal or other fuel. The difficulty is to discriminate between gas used for lighting and that used for heating through one set of pipes. As an alternative to this, there seems to be a choice of two systems—the adoption of a small discount meter in connection with each fire, or the free piping of houses, so as to provide a separate supply for fires. As this, to my mind, is our greatest outlet, I hope that these suggestions will elicit a free and full discussion.

High-Pressure Lighting.

Mr. Brearley, of Longwood, a short time ago presented to a Joint Conference of the Commercial Sections a paper relating to high-pressure installations, which I hear is to be printed and circulated. A discussion thereon created pessimistic feelings among many in charge of works similar to my own. It can be taken for granted though that the example of Birmingham, as described in the Technical Press,* is a lead that all will have to follow. High-pressure supply, both for lighting and industrial purposes, has now become a necessity, and it remains for us to decide in what way this has to be provided in our respective districts. This question resolves itself in a choice of one of two systems.

1—That of a supply of gas at high pressure by the undertaking, either from a central station through distributory mains or by district compressing plants.
2—By private installations at the expense of the consumer.

In large cities and towns, doubtless there is a field for the latter system, because the advantage gained by the installation of a compressor for large undertakings is commensurate with the cost of the installation. But for small installations, where the cost of a compressor is the question which will decide its introduction, I am convinced that the first scheme is the one for adoption. The former system also has the advantage of being under the control of the gas engineer, and also prevents the trouble which I feel must be experienced by the growth of private installations, of causing unsteady lights in close proximity to the point where the compressor is connected to the low-pressure main.

I was not discouraged by the discussion above referred to, and have since put down a Keith compressor, and laid the first instalment of a high-pressure main to provide the supply for an installation consisting of four 1000-candle power lamps, and one 500-candle power lamp outside, and five 300-candle power lamps inside. I might say here that, although this customer was quite prepared to purchase the lamps, he would not entertain the cost of an engine and compressor. From the display of lighting, I have received numerous inquiries for a similar supply. It is now intended to canvass for private consumers, and make an effort to secure the public lighting *en route*, and to extend this main through the centre of the town. The cost of the whole installation, including the main, I estimate will be £200, the annual interest upon which will only amount to £10; and I have not the slightest doubt of the income being sufficient to warrant the outlay.

In Mr. Brearley's paper, various methods of charging for high-pressure lighting were submitted. But they chiefly referred to London and district undertakings; and as the class of consumer is so different from those in urban districts such as most of us supply, I scarcely consider any of them suitable for this district. I distinctly favour the registration of gas consumed by private consumers; but hitherto the difficulty has been to correct the volume in consequence of the increased pressure, as according to Boyle's law, that "the volume of any gas varies inversely with its pressure," we find that

at 50 inches of water, the corrected volume should be 12·25 per cent. more
,, 100 ,, ,, ,, ,, ,, ,, ,, ,, 24·5 ,, ,, ,,
,, 407 ,, ,, ,, ,, ,, ,, ,, ,, 100·00 ,, ,, ,,

The demand for a meter to automatically make these corrections has soon been met, and there is now a meter fitted with a patent compensating index with variable gearing controlled by an aneroid, which is acted upon by the pressure of the gas, and giving a proportionately increased movement with an increase of pressure. Using this method, the registration indicates the volume at normal pressure, whatever the actual pressure is. The question of the method of charging is, however, a matter to be left to the discretion of the engineer; but I certainly feel that, whatever system is adopted, care should be taken that charges other than for gas and maintenance should be kept entirely distinct, so as to prevent invidious comparisons with other forms of lighting.

Testing Meters in Situ.

Owing to the large increase in the number of meters now in use, particularly with regard to slot-meter installations, the question of the periodical testing of consumers' meters is becoming a serious matter. The old method of disconnecting the meters and taking them to the works to be tested is one to which many objections can be raised, the chief of which, however, is the enormous cost. No doubt many engineers have ideas of their own on this question which they have put to practical use. In my own case, when the time arrived for a systematic testing of slot meters, I felt that some system must be introduced to test them *in situ*; and the only means at hand to accomplish this was the ordinary test meter. This, however, has one great disadvantage, inasmuch as it is impossible for the inspector to have the test meter and consumer's meter at zero at the same time. This involves calculations on his part which admit of the introduction of errors.

I made an attempt to overcome the difficulty by having a test meter made introducing three or four novelties, so as to lend itself to easy manipulation.

Description of Meter—See p. 602.

On the main spindle C, is mounted a worm C^1, which engages with a wheel C^2 mounted on the dial-driving spindle D in the ordinary manner. But, instead of such driving spindle being in one piece right through to the dial, it is divided into two parts—one end of one part D^1 carrying a disc or the like D^2, carrying a stud D^3 (figs. 2 and 5); the spindle being formed hollow at D (fig. 2). The other part D^5 is provided with an extending portion D^6, to fit into the hollow portion D^4, and mounted on the other part is another disc or the like D^7, carrying a slot or aperture D^8 (figs. 2 and 4), into which the stud D^3 on the first disc may fit and revolve same. The disc D^7 is, however, mounted loose on the shaft D^5; a spring E between it and the dial case F pressing the

* See "Journal" for Feb. 14, p. 437.

* See "Journal" for Nov. 1, 1910, p. 313.

disc against a boss held on the spindle D^5 by a pin E^1. The usual train of wheels for operating the index is used; and the index hand G is mounted on the dial on the second part D^5 of the spindle D. The dial is suitably divided—say, into hundredths—and marked with letters indicating fast and slow, as shown in fig. 6. The movement of the index finger G by the hand allows the spindle D to move without operating the disc and gearing of the meter, and it may be readily set at zero—the spring E, however, holding the loose part of the spindle and loose disc fast for propulsion.

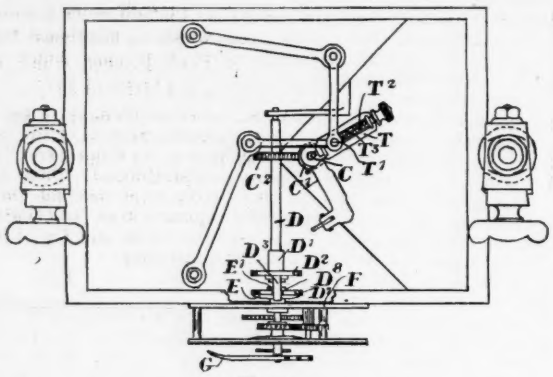


Fig. 1.

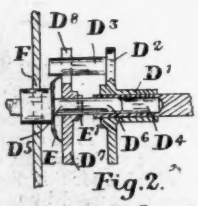


Fig. 2.

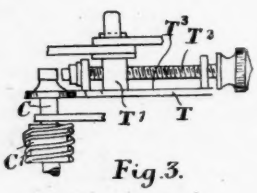


Fig. 3.

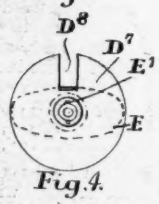


Fig. 4.

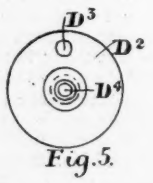


Fig. 5.

Fig. 6.

The tangent is provided with a peg or stud mounted on a screw and slide, so that the stud may be moved nearer to, or further from, the main spindle. By this means, the meter can be readily corrected by a test holder at any time so as to ensure accuracy. Two stopcocks are provided on the inlet and outlet of the meter. To the inlet of the meter is attached one end of a metallic tube; the other end of the tube being connected to the outlet of the meter to be tested *in situ*, by means of a series of union couplings made to fit the various sized outlet connections of the consumers' meters, but all provided with a uniform outlet—say, ⅜ inch. The lid of the meter is hinged, and carries a small box for containing the burner and unions. These provisions enable the inspector, when the meters are coupled up, to first of all pass sufficient gas to get the consumer's meter at zero, close the burner-tap with the movement of the finger, put the test dial at zero, and, after passing a fixed quantity (say, one or two feet) through the consumer's meter, close the tap again; and as the meter dial at the close of the test gives a result sufficiently accurate for an inferential test with a meter of this description, an inspector can, without difficulty, test four meters per hour.

Advertising.

Lastly, let me refer to the advantage of judicious advertising. It is only in this way that we can keep the public informed of the benefits and advantages of gas for lighting and industrial purposes, and also of the facilities that we offer, whether it be in respect of slot installations, free gas-fires, maintenance, or supply under high pressure. I therefore hope that the scheme of advertising suggested by the Publicity Committee of the Institution of Gas Engineers will receive general support, in order that these advantages may be made known to every gas consumer throughout the country.

Discussion.

The President, in opening the discussion, said Mr. Hudson was to be congratulated on the success which had followed the introduction of his system of maintenance, and of free gas-fires particularly. To have secured an increased consumption of 53 per cent. where fires were supplied, and a profit equal to 30 per cent. on the outlay, was certainly well worth having. With regard to the fixing of gas-fires free, he thought it would be agreed that those engineers who were in charge of corporation undertakings had not quite the same latitude that Mr. Hudson had by his connection with a company. There was one point about gas-fires he was not quite clear upon. If there was an increase of 53 per cent. in the consumption per meter, the output would be such as to necessitate an enlargement of the manufacturing plant; and the question occurred as to whether the author included in his 1s. 3d. as the cost of gas per 1000 cubic feet manufactured, the capital charges that would cover the additional manufacturing plant that would be necessary to meet the increased consumption. Then, as to Mr. Hudson's point that differential rates should be given by concession to large consumers, irrespective of the way the gas was consumed, he did not think this was altogether fair.

Mr. H. Townsend (Wakefield) said that in his case they had not gone so far as to supply gas-fires free of all charges; but they did supply them at a very cheap rate. They made a charge of 1s. a quarter, and fixed the fires free. He would, however, be very chary in going to the length Mr. Hudson had done and supply fires free. It seemed to him it might involve the necessity for discrimination, and place an onus upon the gas engineer that was not desirable, particularly having regard to the capital outlay. Some of the members of the Manchester District Institution had gone in for the supply of cookers absolutely free; but he had looked at it with a certain amount of apprehension, because of the capital outlay, which might easily be tremendously heavy. It would be interesting if, in the course of the discussion, those who had introduced this system would give the members the benefit of their experience, and some information as to the capital outlay and the returns they had of cookers which had been supplied free. A great many of them knew that a lot of these cookers were sent back after the first year or two. Turning to Mr. Hudson's references to the advantages of judicious advertising, he said it seemed as if the scheme of the Publicity Committee of the Institution of Gas Engineers had had a rather awkward start. It was regrettable that the scheme should have had such an unhappy beginning; but such was the importance of the advertising proposals that he thought it was incumbent on them all to try and undo the mischief which had been caused, and use every effort to bring the scheme to a successful issue.

Mr. E. A. Harman (Huddersfield) said he had not seen his way to recommend his Committee to supply and fit gas-fires free; but he had gone to the extent of supplying them at a very cheap rate—about 1s. a quarter, fixed free. This he considered was as far as they could go in Huddersfield at present. The danger which he feared from supplying and fixing fires free was that people would have them placed in rooms where they would not be used; and they could hardly make a stipulation that each fire should consume so much gas. Still, without a guarantee of some sort, it appeared to him they might easily incur considerable loss in this direction. As to the maintenance of burners, this was a question which they would have to deal with in the near future; and he was glad that Mr. Hudson had brought the point out prominently. On the question of publicity, in his opinion it was of importance they should have advertisements in the local newspapers, bringing to the notice of the public what could be done with gas, and impressing upon them that it was one of the comforts of life.

Mr. S. Glover (St. Helens) asked Mr. Hudson if any difference was made in the cases of cottages where piping was found for the prepayment meters and those which had to be piped by his Company—that was, as to the charges for gas.

Mr. Hudson replied that no difference was made; but where the piping was supplied, it was only for the ground floors and not for bedrooms. So that the cost was not great.

Mr. Glover (resuming) said he was glad to find what he called the "St. Helens system" of supplying cookers, stoves, and grillers free of rent was spreading in British gas supply. He called it the St. Helens system because he believed they were the first to start it. They found that, when they furnished a boiling burner free to a working man's house, there was soon a request for a cooker suitable for the family's requirements, which was supplied free of rent. He did not, however, believe in free fixing, because it involved a considerable outlay upon the gas department in meeting the wishes of the housewife, who liked to have the cooker fixed in a place which meant extra piping. What they did at St. Helens was to supply the apparatus free, and charge only the bare cost of fixing—a system which had the effect of placing a check on the housewife who might desire to have the cooker in the back-yard as the best place. The knowledge that there was a charge for fixing, stopped this kind of thing, because if extra service-piping was required, the people knew it had to be paid for. They had had this system at work for over 15 years in St. Helens; and he was prepared to strengthen the hands of anyone who desired to try the method for an increase in the gas consumption. He was certainly of opinion some charge should always be made for fixing apparatus, to stop people from sending it back from a mere whim—maybe in the summer months. He had also always held that it was for the owner of a house to provide the piping for it. In St. Helens, they had a very large percentage of the houses piped by the owners of the property; and it was becoming more so, because people now-a-days would no longer live in a house where there was not gas. Houses without gas were looked down upon by working people now as not fit to live in; and so the owners had been brought to do the necessary piping. Turning to speak of the charges made to consumers by slot-meter, he said he was afraid

many gas engineers were too much wrapt up in the idea about having a definite return for every bit of apparatus they might put in, instead of recognizing that the more they had the greater their consumption would be. He instanced that in St. Helens the charge for gas to slot-meter users was only 2d. per 1000 cubic feet more than that paid by the ordinary consumer.

Mr. W. WHATMOUGH (Heywood) said that some time ago, when he was considering how to extend the consumption of gas in Heywood, he heard of Mr. Hudson's experience with free gas-fires. After considering the matter carefully, it was decided to make an experiment with gas-fires by which hirers were only charged rent for the winter quarters—the summer quarters being free. The following scale of charges and instructions were drawn up:

No. 1 size, not exceeding 16s. net, 6d. per quarter.
No. 2 size, exceeding 16s. but not exceeding 23s., 1s. per quarter.
No. 3 size, exceeding 23s. but not exceeding 30s., 1s. 6d. a quarter.
Fires exceeding 30s. value to be paid for in cash, or the three years' hire-purchase. Cash sales 20 per cent. off list. Hire-purchase, 20 per cent. off list, *plus* 5 per cent. per annum for interest.
Consumers must be given to understand distinctly the cost per hour for gas consumption; and if the apparatus is required for constant use, the increased cost compared with coal must be pointed out to consumers. All gas apparatus fixed free of charge up to 30 feet of piping, and exceeding that distance to be paid for by the consumer; the pipe and fittings to remain the property of the Corporation.
If the gas supply is required at the differential rate, and there is no connection on the premises, 6d. per quarter must be paid for the rent of the meter.
All orders must be signed for in the order book provided by the Corporation, and approved by the gas manager before acceptance.

A canvass was made of the borough, and very shortly they had a hundred consumers. The following statement showed the actual cost of fifty gas-fires and fittings fixed upon simple hire between Dec. 1, 1910, and Jan. 10, 1911:

Net cost of fifty gas-fires	£51	7	5
Net cost of fixing	12	1	9
Total	£63	9	2
Total hire per annum, £4 5s.; average, 1s. 8·4d., or 6·7 per cent. on total expenditure.			
Average cost per fire	£1	0	6
,, ,, of fittings	0	4	10
Average cost of fire and fittings	£1	5	4

Upkeep extra.

Mr. ALEX WILSON (Glasgow) said he had been greatly interested in hearing Mr. Hudson's paper, and he was equally interested in Mr. Glover's statement of what had been done in St. Helens. For himself, he had never got down to the point of doing things free. Up in the North, they thought that if a thing was done free and without pay, people did not value it. He well remembered the time when they could not get farmers to take away the waste lime from the works, although it was free. When they began to charge for it, there was a change; and now they could not supply the farmers' requirements. With reference to Mr. Hudson's remarks as to maintenance, he certainly thought it was a matter they would have to pay more attention to than they had done in the past. If they were to keep gas lighting up to its proper standard, this question of maintenance would have to be dealt with. Speaking of the Publicity Committee, he said he was glad to have this opportunity of saying something about the criticisms which had been directed against the action of the Committee. The question of the circular and the people to whom it should be sent was thoroughly discussed by the Committee, with a view of avoiding any friction. It would appear, however, that they had actually caused some friction. What they did was this. They sent the circular to the chairmen of all gas undertakings, believing that the secretary or the manager would see that the matter was explained at the proper time. The circular was sent to the chairmen so as to avoid any jealousy in cases where there was a secretary and a manager. If a mistake had been made, they must set to and rectify it. If the Publicity Committee had gone on the wrong lines, they were prepared to be put on to the right lines, so that the greatest benefit could be secured for the whole industry; and he asked that the Publicity Committee should have all the help that could be given to bring about this result.

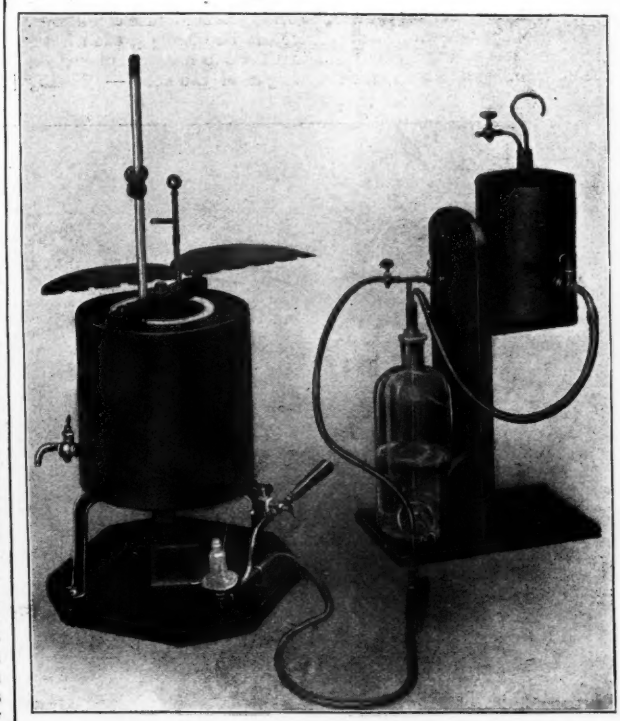
The PRESIDENT at this stage suggested that the further discussion of Mr. Hudson's paper be deferred to the next meeting, in view of the lateness of the hour. This course was agreed to by general consent.

Large Venturi Meters.—According to the Engineering Supplement to "The Times," up to the present, the largest Venturi meter in America was a 96-inch one at Pittsburg (Pa.). But the Builders' Iron Foundry, Providence (R.I.), recently completed the parts of a 102-inch tube for a new conduit which will supply water for the municipal system of Montreal. It is not expected that this meter will be required to measure beyond 70 million Imperial gallons per 24-hour day; but if the head and the capacity of the conduit are increased, it will register as high as 193 million gallons. This meter is surpassed by two 120-inch tubes installed at the Divi Island Pumping-Station, Madras, a little more than a year ago. These tubes register up to 625 cubic feet per minute, or approximately 336 million gallons a day. It is stated that even this large meter will not retain its supremacy very long, as the Builders' Iron Foundry has under construction the parts for a still larger one.

A GAS-CALORIMETER FOR SMALL QUANTITIES OF GAS.

Mr. J. H. Coste, Chief Assistant Chemist to the London County Council, in December, 1909, read a paper on "Technical Gas Calorimetry" before the London Section of the Society of Chemical Industry [see "JOURNAL," Vol. CVIII., pp. 378, 407], in which he referred to calorimeters in which the water is at rest, as distinct from the flow or continuous calorimeters of the Junkers and Boys types. He mentioned instruments devised by Hempel, as also by Simmance and Abady, of the still-water description. Another still-water gas-calorimeter, which he mentioned but did not describe, is that of Professor Ferd. Fischer, which works satisfactorily with small quantities (3 to 5 litres) of gas.

Messrs. J. H. Coste and B. R. James on Monday of last week, brought before the meeting of the London Section of the Society of Chemical Industry a "New Still-Water Gas-Calorimeter" which Mr. Coste has recently devised. Unfortunately, three papers were read and discussed earlier at the same meeting, and very little time then remained for the explanation of the calorimeter. It has been made by Messrs. William Sugg and Co., Limited, and is shown in the accompanying illustration.



It is intended to determine the calorific power of gas from the combustion of so small a quantity as one-twentieth of a cubic foot. This quantity is measured by, and delivered to a porcelain luminous burner from, a gasholder constructed on Mariotte's principle, so that it delivers the gas at constant rate and pressure throughout the test. The rate of flow of the entering water is, however, momentarily reduced by means of a bye-pass when the water-level approaches a centralized metal point by which the volume of gas to be burnt is indicated. The contact of this point with the water is well defined, and the volume of gas delivered is not affected by small errors when levelling the apparatus. The burner is swung under the central cylindrical flue in the body of the calorimeter at the moment when contact is made between the measuring water and the point.

The calorimeter consists of a nickel-plated copper vessel, holding about 2·3 kilos (say, 4 pints) of water, placed within a large annular air and water jacket. The volume of water in the calorimeter is fixed by contact of its surface with a depending metal point. A wooden bridge carries this point, the thermometer, and a double horse-shoe stirrer. The central flue or combustion chamber into which the gas-burner is introduced is of corrugated copper tubing, and from it the products of combustion pass into an oval copper box, where they are baffled, and pass down lateral tubes of flattened corrugated copper tubing.

The authors stated that the calorimeter effected very satisfactory cooling of the products. The rise of temperature of the water with gas as supplied in London was about 3° C., and 4 minutes were occupied in the combustion of the gas. The errors involved in the use of this instrument which had been investigated were: (1) Variation in amount of gas burnt; (2) *a*, adjustment of the amount of water in the calorimeter; *b*, imperfect mixing of the water; *c*, the water equivalent; *d*, the radiation, evaporation,

conduction, and friction of the stirrer; *e*, imperfect cooling of the escaping gases; *f*, water vapour in the escaping gases. These errors were all small—some could be neglected, and others could be thrown on to the water equivalent of the instrument.

In the brief discussion which followed the description of the calorimeter, Mr. G. Nevill Huntly expressed his appreciation of the instrument, which he thought compared favourably with Hempel's pattern. Dr. Lessing referred in complimentary terms to the calorimeter described by the authors; as also to Professor Strache's calorimeter [see "JOURNAL," Vol. CXI., p. 387], in which he believed the quantity of gas consumed was only about 20 c.c. But he understood that this was a relatively expensive instrument.

ISLE OF WIGHT GAS ASSOCIATION.

The Seventh Annual General Meeting of this Association was held at Ryde on Saturday.

On assembling at the gas-works, there was seen at work a new type of manual retort-charging machine specially adapted for use in small works, which is about to be put on the market by the "Simplex" Retort-Charging Machine Company.

The charger is the invention of Mr. Bird, who has had a large experience in this class of work with Messrs. Biggs, Wall, and Co., and has been experimenting at Ryde since the summer of 1909; making alterations and improvements in the machine as they suggested themselves under practical working retort-house conditions. In the machine shown at work, there are two scoops, each holding 3¼ cwt. to 4 cwt. of coal (sufficient for one charge), placed on a frame so that one balances the weight of the other—reducing the labour required to elevate them into position for the various tiers of retorts. The scoop is propelled on four revolving cradles into the retort by chain and sprocket gearing working on to a small drum round which is wound an endless wire rope attached to the outer end of the scoop. On reaching the end of the retort, the coal is discharged by opening the scoop (which is divided longitudinally) by means of a short lever. The scoop is then withdrawn by turning the chain and sprocket gearing in the reverse direction, when the two halves of the scoop are returned to their original position, by means of the short lever, ready to receive the next charge of coal.

There was also shown a smaller machine, which has only one scoop, and is adapted for use in the smallest of works.

The business part of the meeting was held in the Board-Room. The chair was occupied by Mr. F. F. FARRAND, supported by his Chairman and a Director, who in a few well-chosen words welcomed the Association to Ryde, stating that they fully recognized the good work being done by the Association in the interests of the different gas companies.

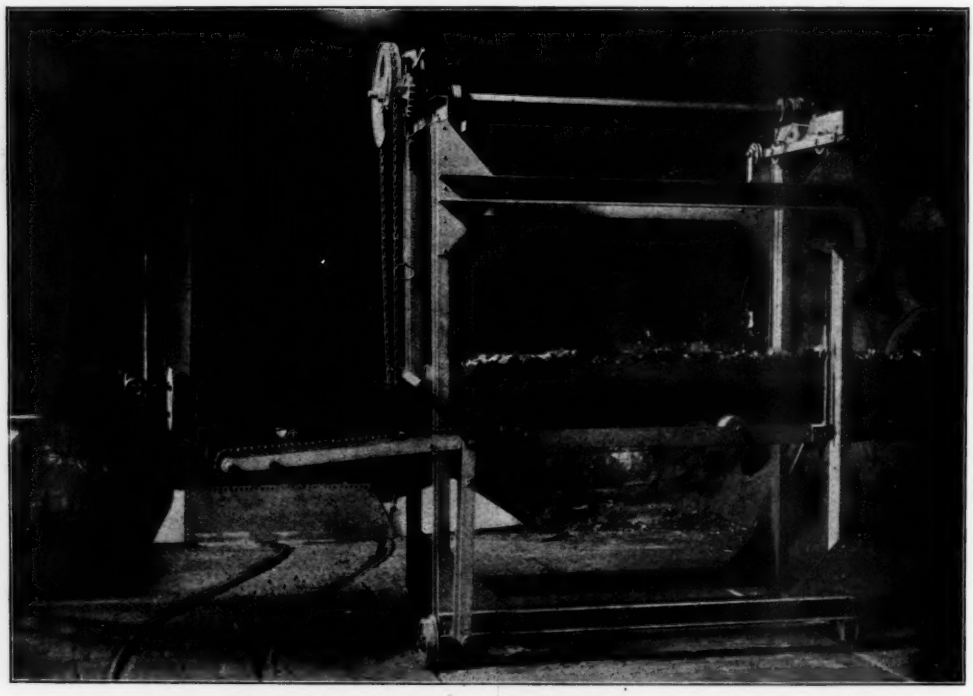
The report of the Management Committee was received and adopted, on the motion of Mr. G. W. BALL (Chairman of the Cowes Urban District Council Gas Department), seconded by Mr. HIBBERT (the owner of the Yarmouth Gas-Works).

The statement of accounts was submitted and approved.

The Hon. Secretary and Treasurer, Mr. E. H. Millard (Cowes), was re-appointed, as also was Mr. W. Halliday, as Auditor.

On the motion of Mr. R. FISH (East Cowes), a donation of three guineas was voted to the Benevolent Fund of the Institution of Gas Engineers.

The members subsequently were entertained at high-tea; and the usual votes of thanks brought to a conclusion a very pleasant and profitable meeting.



The "Simplex" Retort-Charging Machine.

Professor Wertheimer on "Water-Finders."

At the ordinary meeting of the Society of Arts last Wednesday, Professor J. Wertheimer, B.Sc., Principal of the Merchant Venturers' Technical College, and Dean of the Faculty of Engineering in the University of Bristol, gave in a colloquial form, illustrated by lantern views, the main features of a paper prepared by him on the subject of "Water-Finders." In it he recorded in detail the results of some experiments carried out under his supervision, which were not altogether favourable to the "dowser." The conclusion come to by the author was that the motion of the divining-rod and the sensations experienced by the holder of it are not due to any cause outside himself. He said his idea was that when the dowsers with whom he experimented stated that they did not cause the rod to move, "they were saying what they believed to be the truth, but were unconsciously misleading themselves." The paper had been submitted to Professor Barrett, of Dublin, who has now for a long time taken an interest, from the psychical standpoint, in divination for water, and he sent a communication which was read at the opening of the discussion. He said his own conclusions were that the involuntary motion of the rod, or the *malaise* which occurs in certain dowsers on approaching the hidden object of their search, whatever that object may be, arises "from an obscure nervous reflex and muscular spasm, which is stimulated by suggestion and also by other causes." The text of the paper, with Professor Barrett's communication upon it and notes of the few remarks to which it gave rise, will be found in the current number of the Society's "Journal."

Petrol Air-Gas.—Mr. E. Scott-Snell will read a paper on this subject at the next ordinary meeting of the Society of Engineers, which will take place on Monday, the 6th prox., at the Institution of Electrical Engineers, Victoria Embankment. Towards the close of his paper, the author will make some comparisons of the cost of petrol air-gas with coal gas and acetylene.

Manchester Institution Lectures.—The sixth lecture of the series arranged to be held in the Manchester University will be given by Dr. J. A. Harker, F.R.S., Head of the Thermometry Division of the National Physical Laboratory, next Saturday; his subject being "The Measurement of High Temperatures." It will be illustrated by numerous experiments. The chair will be taken by Professor Harold B. Dixon, F.R.S. In view of the increased attention now being given to pyrometry, it may be hoped that the lecture will be well attended.

SOME PHENOMENA AND APPLICATIONS OF THE ELECTRIC CURRENT.

By J. G. Clark.

[A Paper read before the London and Southern District Junior Gas Association, Feb. 24.]

The subject of this paper I venture to think should form part of the study of all interested in modern lighting, heating, and power problems. It was at the suggestion of our President that the Council included the paper in the programme; and when they did me the honour of asking me to write it, I accepted the invitation, but did not quite realize at the time the difficulties to be encountered. The principal difficulties were: (1) The enormous scope of the subject. (2) The fact that, though many of our members are already well acquainted with the subject, others perhaps have not yet given it much thought. To the latter, I would say, Do not take Punch's advice, but do.

After reflection, the course I decided on was to enumerate very briefly some of the fundamental laws of the electric current and to indicate and discuss a few practical applications which are of more or less interest to modern gas men. Moreover, I decided to avoid absolutely any reference to mathematics. But this must not be taken to imply that mathematical methods are unnecessary. On the contrary, he who would have a little more than a superficial knowledge of the subject, will find mathematics a necessity, and a most valuable tool when used with a strict regard to its limitations.

The science of applied electricity may for present purposes be divided into electro statics and electro dynamics; the former dealing with phenomena arising from electricity at a standstill, and the latter dealing with electricity in motion or the electric current. I propose to choose the subjects for this evening from electro dynamics; this being of far greater practical utility than electro statics. For our purpose we may regard the electric current as capable of producing the following results: (1) Heat and light. (2) Mechanical power. (3) Chemical effects.

Ohm's Law.

This is a fundamental law of the electric circuit, and may be stated as follows:—

$$\text{Current (in amperes)} = \frac{\text{E.M.F. (\textit{in volts.})}}{\text{Resistance (in ohms)}}$$

From this law, the following statement is derived—Power in circuit (in watts) = current (in amperes) × E.M.F. (in volts). And further—

Energy consumed (watt-hours) = watts × (hours of use).

1 B.T.U. = 1000 watt-hours or 1 kilowatt-hour.

Having stated briefly the relation between the most common factors which go to make up an electric circuit, we may pass on to consider some of the phenomena.

Production of Light and Heat.

Just as with the production of light by gas combustion, the electrical methods are capable of great improvements. The luminous efficiency of all practical light-producing methods is notoriously deficient. When electricity flows along a conductor, it meets with a resistance similar to that met with by gas or water or any fluid passing along a pipe. This resistance results in the loss of a certain quantity of electrical energy and the production of heat and light. The amount of energy degraded into heat by the resistance is equal to (resistance in ohms) × (current in amps)^2; the result being the number of watts. Thus—if the resistance in a circuit is 5 ohms and the current 10 amperes, the quantity of electricity converted into heat would be—

$5 \times (10)^2 = 500$ watts, or 0·5 unit per hour.

The heating value of the electric current is as follows:—

1 kilowatt	3441 B.Th.U. per hour
1 watt	3·441 ,, ,,

The quantity of heat produced in the above-described circuit would therefore be $\frac{3441}{2} = 1720$ B.Th.U. per hour. Just as with gas heating, a certain loss of heat is unavoidable in practice—*i.e.*, the thermal efficiency of any process is always less than 100 per cent. In practice, the useful heating effect of an electric current is usually developed by directing it along a resistance specially arranged for the particular purpose.

The thermal effect of the electric current has found application in cooking and warming; and, as bearing upon the subject, the following figures given by Professor Fleming in a lecture delivered at the Royal Institution in June last are interesting. They were published in the "Electrician" of June 17, 1910.

Description of Apparatus.	Energy Required to Raise 1 Pint of Water from 60° to 212°.	To Heat 100 Gallons from 60° to 212° Calculated from Prof. Fleming's Data.
Prometheus electric saucepan	60 watt hours	48 electrical units
,, ,, kettle	65 ,, ,,	52 ,, ,,
Isenthal immersion electric heater	66 ,, ,,	52·8 ,, ,,
Gas-ring "Kwik" kettle	89 ,, ,,	445 cubic feet of gas
Gas-ring ordinary kettle	99 ,, ,,	495 ,, ,,
Kettle used with separately heated electric stove	98 ,, ,,	78·4 electrical units

The bottom row of figures was not given by Professor Fleming, but are included for comparison. They indicate what might be expected from some of the most recent systems of electric saucepan and kettle heating, in which the heating element is quite separate from the vessel to be heated. These systems make electric heating applicable to ordinary utensils, but are necessarily less efficient than those in which the heating element is included in the utensil.

The production of light by electricity is, of course, a development of the heating effect. A special resistance in the form of a fine filament is traversed by the current, and is thereby raised to a high temperature, when, by a process of selective radiation, it emits luminous rays. The Tungsten lamp is one of the latest developments in this direction, and is, according to some recent experiments, capable of producing light with an efficiency of 1 candle for a consumption of 1¼ watts. The arc lamp is another application of the heating effect. In this case, the heat is developed at a pair of electrodes, and the light emanates either from the heated electrodes or from the arc which is produced between them.

An interesting recent application of electrical resistance is found in the "Watkin" switch. The object of this device is to effect economy in the use of electricity for various purposes, particularly for "turning down" the electric light. The principle is extremely simple, and consists in placing more or less resistance in series with the lamp. In accordance with the well-known law respecting the relation between the light given by a filament lamp and the terminal voltage, the reduction in light is much greater than the saving in current. In fact, according to some researches made by Mr. A. C. Jolley, the results of which were published in the "Electrician" of Aug. 13, 1909, the following results might be expected: Assume that an Osram or Tantalum lamp is used on a 100-volt circuit, and that their illuminating powers at 100 volts are 35 and 26 candles respectively.

Saving in Current Due to Switch. Osram. Per Cent.	Tantalum. Per Cent.	Terminal Voltage of Lamp.	Candle Power of Lamp. Osram.	Tantalum.
0	0	100	35	26
6·5	6·9	90	23	18
13·1	13·8	80	15	11
19·4	21·7	70	9	6
26·5	30·0	60	5	3
33·5	38·1	50	3	—

Production of Mechanical Power.

When a conductor carrying current is placed near a poised magnet, the latter will move and tend to lie in a direction at right angles to the wire. This action can be shown to be mutual, and is due to the magnetic effect of the electric current. The magnetic field set up by the current is at right angles to its direction, and the poised magnet tends to lie with its axis in that field. If a conductor carrying current is in the form of a spiral or solenoid, it will behave exactly like a magnet; the poles being situated along the axis and near the ends of the spiral. This magnetic effect is enormously increased if a bar of soft iron is placed in the solenoid, as is usually the case in practice. This phenomenon has a number of applications; in fact, it is incorporated in practically every electrical appliance or instrument that can be named, and is a fundamental principle of all dynamo-electric machinery.

An application which is of great importance in gas supply is the operation of gas-valves at a distance. There are a number of electric distance-lighters; but so far as the operation of the valve is concerned, they are identical in principle—*i.e.*, it is the magnetic effect of the electric current that is applied. They may, however, differ in regard to ignition—viz., they may have spark or glower igniters. The current for the operation of the lighters is usually derived from electric cells. These are too well known to need description; but it may be interesting to consider some methods of grouping them for particular purposes. There are two methods of grouping known as parallel and series grouping respectively. Fig. 1 represents six cells grouped in (*a*) series and (*b*) parallel. There is a third method—a combination of series and parallel.

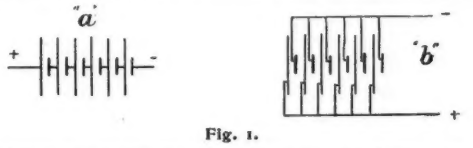


Fig. 1.

The longer line represents the + element and the shorter line the − element of the cells.

The various methods of grouping cells give rise to various results; and the method which will give the best result will vary with the conditions of working.

Series Grouping.—This method is resorted to when it is desired to produce a battery having a high E.M.F. When cells are arranged in series, the total E.M.F. and internal resistance are equal to the sum of the separate E.M.F.'s and resistances of the cells. Thus, if 12 cells, each having an E.M.F. of 1½ volts and an internal resistance of 1 ohm, are arranged in series, the battery so formed would have an E.M.F. of 18 volts and an internal resistance of 12 ohms.

Parallel Grouping.—This method is used when it is required to produce a battery having a very low internal resistance. When cells are arranged in parallel, the total E.M.F. of the battery is no greater than that of a single cell; but the internal resistance is much lower. Thus, if 12 cells, each having an E.M.F. of 1½ volts

and an internal resistance of 1 ohm, are arranged in parallel, the battery so formed would have an E.M.F. of 1½ volts and an internal resistance of $\frac{1}{12}$ ohm.

Series-Parallel Grouping.—This method is a combination of the series and parallel systems, and is often resorted to in special cases. If we remember the effects of the series and the parallel methods of grouping, we can easily determine the effect of a series-parallel combination. Assume that 12 cells (each having an E.M.F. of 1½ volts and a resistance of 1 ohm) are arranged as shown in b fig. 2.

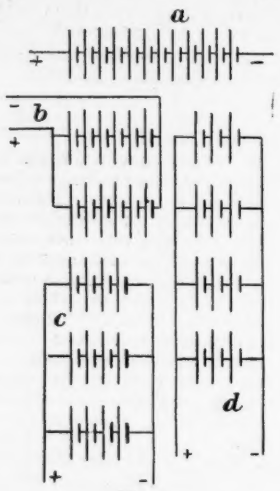


Fig. 2.

We have then two batteries, each made up of 6 cells in series. Each battery will have an E.M.F. of $1{\cdot}5 \times 6 = 9$ volts. But as they are in parallel with each other, the whole 12 cells will give only 9 volts. The resistance of each of the 6 cell batteries will be $1 \times 6 = 6$ ohms; but as they are in parallel, the joint resistance will be only $\frac{6}{2} = 3$ ohms. The result of the grouping is, therefore, the production of a battery having an E.M.F. of 9 volts, and an internal resistance of 3 ohms.

It is possible to arrange the 12 cells in four different ways; and it will be interesting to compare the current that would be obtained if the batteries so produced were used on a circuit having an external resistance of 3 ohms.

Grouping.*	E.M.F. of Battery.	Resistance.			Current.
		Battery.	Circuit.	Total.	
					Ampere.
a	18 volts.	12	+ 3 =	15	1·2
b	9 ,,	3	+ 3 =	6	1·5
c	6 ,,	$\frac{4}{3}$	+ 3 =	4·33	1·4
d	4½ ,,	$\frac{3}{4}$	+ 3 =	3·75	1·2

* The group letter corresponds to fig. 2.

It will be seen from the table that it does not follow that the grouping which gives the highest E.M.F. necessarily gives the greatest current; for whereas the grouping that would give 18 volts would yield 1·2 amperes, that which would give only 9 volts would yield 1·5 amperes. The whole question is one of the proportion of the internal resistance of the cells to the resistance of the external circuit; and the condition necessary for the production of the maximum current in a given circuit with a given number of cells is that the cells shall be so arranged that their joint resistance is equal to the resistance of the external circuit.

In the operation of electrically-controlled burners the problem is not so much the production of the maximum as the production of sufficient current to operate the burner. For instance, the normal current of a Telephos lighter is about 0·6 ampere; and a sufficient number of cells arranged in series should be provided to give this. An increased current would be produced by adding more cells in series; but it would be found preferable to put them in parallel, as by so doing the current flowing through the separate cells would be reduced, and their life thereby prolonged.

Chemical Effects.

The chemical effects of the electric current have found a number of applications. An important one is that of electro-plating, by which process dense and homogeneous deposits of various metals may be produced on metallic articles. This effect of the current is described as electrolysis. Nickel plating is very extensively adopted, and may some day find a use in the repair shops of gas companies. The plating processes are extremely interesting. They consist in passing a comparatively low voltage electric current through a bath containing a solution of the metal to be deposited. The metal is deposited at the terminal at which the current leaves the plating bath, and any articles suspended therefrom are plated. The amount of metal deposited depends on the particular metal used; and, as bearing upon this, the following table is interesting.

Description Metal.	Quantity Deposited by 10 Amperes. Grammes per Hour.
Hydrogen	·3736
Iron	10·461
Copper	11·768
Tin	11·002
Zinc	12·123
Silver	40 237
Gold	24·433
Nickel	10·946

Another aspect of electrolysis that is of great interest to gas companies is the electrolytic corrosion of pipes. The corrosion is brought about by the faulty return conductors of electricity distributing systems—*i.e.*, if the return conductor is not electrically continuous, the current may prefer to divide itself at the faulty point, and continue its travel in the nearest gas or water pipe. It may happen later that an electric fault will occur in the gas or water pipe or that the pipe will turn in an opposite direction to the return conductor of the electrical system, in which case the current would leave the pipe, and perhaps enter another or find its way back to the proper return. Unfortunately, each time the current leaves the gas or water pipe, it sets up the corrosion known as electrolysis. A method of preventing this form of corrosion is to improve the electrical conductivity of the return conductor. In the case of traction systems working on the earthed-rail return system, the desired conductivity may be obtained by bonding the joints or else by connecting the rail to a special feeder.

Another interesting application of electricity for chemical purposes is the sterilization of water and other things by the action of ultra-violet light. This is, of course, not an electrolytic action; but, so far as I know, the highest actinic effects yet produced are due to electrical methods. A special form of vapour lamp, when excited by the current, yields a light very rich in the ultra-violet rays. For the sterilization of water, the lamp is enclosed in a chamber through which the water passes. It has been found to be possible in this way to render the water almost absolutely sterile, and certainly sufficiently so for all practical purposes.

Alternating Current.

So far we have considered what is called the continuous current—*i.e.*, a current which flows continuously and always in the same direction. There is, however, the other system of distributing electrical energy by what is called the alternating current—*i.e.*, a current which flows to and fro in the circuit. Although the fundamental principles of the alternating current are the same as for the direct current, yet the continuous ebb and flow sets up a number of secondary and complex, but extremely interesting, phenomena. It is a rather difficult subject to deal with without resorting to the use of mathematics; but it may be interesting to consider it in regard to a piece of apparatus with the existence of which you are all more or less familiar. I refer to the choking coil.

In considering the difference between the continuous and alternating current, it must be noted that, whereas the former flows continuously in one direction and is of constant value (assuming the conditions in the circuit to remain constant), the latter not only alternates, but varies enormously in its value, going through a complete cycle for each complete alternation. The number of alternations per second is termed the periodicity; and for our examples we may assume a periodicity of fifty complete cycles or periods per second.

The best way to deal with this subject is by the use of a diagram indicating the variation in the strength and direction of the current with regard to time. Fig. 3 is such a diagram. The distance from A to B may represent the period of a complete alternation of the voltage—say, 1-50th of a second. This is divided into 20 parts, so that each part represents 1-1000th of a second.

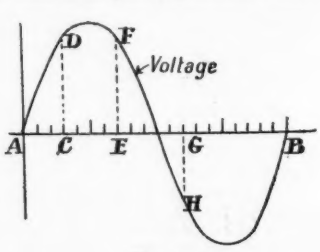


Fig. 3.

We may therefore regard the vertical height of the wave curve as representing the value of the voltage at the particular time. For instance, the voltage after 3-1000ths of a second is represented by the height of CD, and after 7-1000ths of a second by the height of EF, and so on. At 10-1000ths of a second, the voltage is 0; and immediately after, it begins to flow in the opposite direction—its value being represented by the length of the vertical line, as before. For instance, after 12-1000ths of a second, it is equal to

GH, and so on. A proper understanding of the meaning of this diagram simplifies remarkably the study of alternating currents.

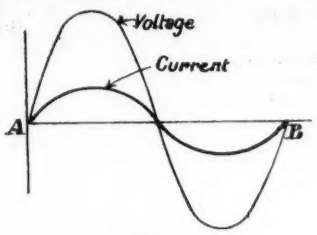


Fig. 4.

If the alternating current follows a cycle similar to that of the voltage, we may represent it in the same way. Fig. 4 shows the voltage and current curves in the same diagram. Again, remembering that the power in watts in a circuit is the product of amperes and volts, we may, by measuring the amperes and volts at any particular time, calculate the corresponding power; and if this is done, we get a power curve. Such a curve is shown in fig. 5.

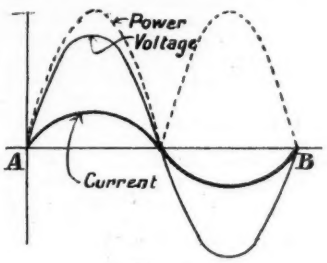


Fig. 5.

In fig. 4, we have the voltage and current rising and falling together in absolute synchronism—*i.e.*, when the volts are 0 the current is 0, and when the volts are at maximum the current is at maximum. In practice, however, a most interesting phenomenon arises. As previously mentioned, almost every electrical apparatus contains an electro-magnetic principle; and whenever this exists in an alternating current circuit, it has the effect of putting the amperes and volts out of phase with each other—*i.e.*, the one does not rise and fall in exact synchronism with the other. It is for this reason that figs. 4 and 5 do not really represent what takes

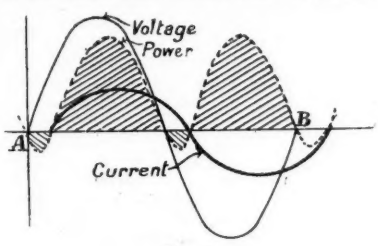


Fig. 6.

place in practice. Fig. 6 indicates more nearly what happens in practice. It will be seen that the current does not begin to flow until about 2-100ths of a second after the volts have been applied; and though it rises and falls, it is always 2-100ths of a second behind the voltage. How does this displacement affect the power in the circuit? If the power is calculated from the simultaneous values of the volts and amperes in fig. 6, we obtain the power curve which is shown shaded in the same diagram.

If now we compare the power curves in figs. 5 and 6, we shall see an interesting difference. Whereas in fig. 5 the power curve is always above AB, thereby indicating its value to be always positive, the corresponding curve in fig. 6 is partly above and partly below AB, thereby indicating that it is sometimes of positive and sometimes of negative value. You will see therefore that for given values of the current and the voltage, the resulting power is a maximum when the two quantities are in exact phase with each other, and that any displacement that takes place between them reduces the available power by an amount depending upon the displacement. If it were possible to cause the current to be a quarter of a period behind the voltage, the positive and negative powers would be equal, and would therefore cancel each other out, so that we should have the interesting phenomenon of a circuit containing many amperes and many volts but quite powerless—*i.e.*, we should have an "idle" or wattless current.

This brings us to the term "power-factor," which simply expresses the ratio of the power actually available in an alternating current circuit to that which would be available if the volts and amperes were in exact phase. This factor is, of course, always less than 1; so that from the point of view of electricity distribution it is a distinct disadvantage, because it reduces the availability of the circuit as a distributing medium. The means, however, for reducing the power in a circuit is sometimes of great economic value; and the choking coil is used for this purpose. It is simply a special electro-magnetic coil suitably proportioned to cause an intentional and definite displacement between the volts and amperes and a resultant definite reduction of the available power in the circuit.

To show the advantages resulting from the use of a choking coil, we may take two examples. Assume that only one arc lamp is to be used on a 100-volt continuous current circuit. As such a lamp may require only 500 watts—*i.e.*, 10 amperes at 50 volts—some means would have to be adopted to deal with the surplus 50 volts. With continuous current this can be done by putting a resistance equivalent to, and in series with, the lamp. The disposition of the power would then be as follows—

Consumption in resistance	500 watts.
,, ,, lamp	500 ,,
Total consumption chargeable to lamp . . .	1000 watts.

which means that as much power is being degraded and wasted into heat as is used to operate the lamp. Such a method is obviously wasteful, and has the effect of halving the lighting efficiency of the arc lamp—*i.e.*, though the arc is actually consuming 500 watts, it must be charged with 1000 watts. If, however, the current is alternating, then a single 500-watt arc can be used on a 100 volts circuit without necessarily wasting the whole of the surplus 500 watts, as was the case when the current was continuous; and for this purpose a choking coil is used.

A choking coil is nothing more than a means for introducing electro-magnetism into the circuit to produce an intentional and determined displacement between the amperes and the volts. This displacement, as already explained, reduces the power in the circuit; and by carefully proportioning the dimensions of the choking coil, the power available may be reduced from 1000 watts to something approaching the 500 watts required by the lamp. This, of course, represents a great gain in economy. As a matter of fact, it is possible, by means of a choking coil, to operate a 500-watt lamp on a 100-volt circuit with a consumption of 600 watts—thus saving 400 watts compared with the use of a simple resistance. It may be asked, What has become of the missing 400 watts of power, if it has not been degraded and wasted as heat, as would have been the case if a simple resistance had been used? It is a little difficult to answer this question without going into the whole details of the phenomenon, which would take too long on this occasion. If, however, you refer to figs. 5 and 6, you will see that the effect of a displacement between the amperes and volts causes a reduction of the available power, a portion being transferred to the lower side of the datum line AB, and therefore of negative value. Assume fig. 6 to represent the condition existing in the main feeders of an electricity distributing system, then the physical interpretation of the diagram would be that, during the period that the power is negative, power is being returned from the mains to the generators. In fact, if we could follow the mutual action of the dynamo and the engine driving it, we should find that during the period of positive power (as indicated by the portion of the power curve above AB) the engine would be driving the dynamo, but during the period of negative power the dynamo would be acting as a motor and driving the engine.

In concluding my paper, I fear I must apologize for its scanty character, but trust I have made the various points clear and sufficiently interesting. As I pointed out at the commencement, it is difficult to deal with the subject adequately without resorting to more complex methods; but I would strongly advise the more junior members to make it one of their subjects for study.

Discussion.

The Hon. Secretary (Mr. S. A. Carpenter) asked if, with a continuous current, the voltage and the amperes were in exact phase, and also what the advantage of one form of current was over the other. He understood that, with a resistance, the surplus electrical energy was dissipated as heat; but with the use of the choking coil, it was in some mysterious way saved. He did not quite see how the consumers saved the expense of this surplus current.

Mr. Creasey, referring to the figures that had been quoted from the "Electrician," inquired how, taking the energy required by the Prometheus electric saucepan at 60 watt hours and that for the gas-ring Kwik kettle at 89 watt hours, the figure was resolved into cubic feet of gas. On the face of it, one would imagine the gas-ring was taking more energy than the Prometheus saucepan.

Mr. F. Ainsworth remarked that the Ilford electricity people put a kettle in their window once. He forgot exactly what they claimed to be able to do with it; but they did not keep it on view very long. He would be pleased to have the matter referred to by the last speaker made plain, because it would aid those who had to explain things to consumers. One other point he was not quite clear about himself was with reference to lamps that were worked in series. In his district, some of the lamps in a certain part did not give the light that others gave which were in a more central position, and for which the consumer was paying the same amount of money. The inclusive price for 6-ampere lamps for shop lighting, &c., for 500 hours, including lamps, carbons, current, and everything, worked in not more than three in a series, was £12. For four lamps in a series, the charge was £14; and for five lamps, £16. If the current was taken for 1500 hours, they would find lamps, energy, and everything, for (say) £30 15s. How they did it, he did not know. It puzzled him to understand how

they could do this for private lighting, while the charge for street lighting seemed to work out at a higher figure. The supply was said to be a continuous current, at two voltages—230 and 460.

The HON. TREASURER (Mr. J. Hewett) said if they wanted to know the cost of heating water in various ways, they should work it out. He had done so, and found that the 48 electrical units at 1d. per unit would cost 4s., and the 52 electrical units 4s. 4d., while taking gas at 2s. 6d. per 1000 cubic feet, the 445 cubic feet would do the work for 1s. 1½d., and the 495 cubic feet for about 1s. 3d. There was a great difference between 4s. and 1s. 3d.

Mr. D. J. WINSLOW said it was stated in the paper that it was possible, by means of a choking coil, to operate a 500-watt lamp on a 100-volt circuit with a consumption of 600 watts—thus saving 400 watts compared with the use of a simple resistance. He took it there was a corresponding saving to the consumer where the alternating system was in force, and that the 400 watts would not be registered by his meter.

Mr. E. W. ELDRED asked if the author would explain the meaning of the various phases of the alternating current.

Mr. C. J. WINSTONE, referring to fig. 6, inquired whether it was possible to have voltage without amperes.

Mr. CLARK, replying to the points that had been raised, said, in answer to Mr. Carpenter, that in continuous current working the current must always be in phase with the volts. It was only when they got the disturbances due to alternations that displacements were possible. When they switched on direct current, there was during the first very short period a temporary disturbance, or "current rush;" but after this it settled down into a steady and continuous current. They were certainly in exact phase. In fact, they must be, because neither of them was changing. As to the advantages of one system over the other, this was a big question; but for a number of purposes the alternating current possessed many advantages. One of these was that they could transform it from one voltage into another quite easily. It was often more economical to generate and distribute current at a high voltage, and to reduce it by a step-down transformer at the point at which it was going to be used. To do the same thing with the continuous current required some rather complicated machinery. The generating machinery for alternating current work was also simpler in design and probably less in cost. Two members had asked whether the surplus electrical energy which with the resistance coil was dissipated as heat, was saved to the consumer by the use of the choking coil. It was saved to the consumer. The surplus power was returned to the circuit; whereas when a resistance was used, the consumer would have to pay for the whole of the current. Mr. Winstone had asked a question about there being a voltage at a time when there was no current. This might be best explained by a simple illustration. The members knew very well that if they hauled (say) a cart along, they had to apply force for some time before it would begin to move. Movement did not start until a little time after the pulling commenced. The cart, once started, would move with increasing velocity. If the pulling force ceased, however, the motion would not stop, but would continue for a time depending upon the resistance to traction. This was just what took place with alternating electric current in the presence of a choking coil. They applied the voltage; but the current did not follow until a little while after, and when the voltage had been reduced to nought, the current would still continue for a considerable period. He thought the illustration of the moving cart explained the thing in a simple way. As to the figures from the "Electrician," of course, in making these tests, Professor Fleming no doubt measured his gas in cubic feet, but converted the volume into watt-hours for purposes of comparison. This could be easily done when they remembered that one watt-hour equalled 3·44 B.Th.U. A cubic foot of gas having a calorific value of 550 B.Th.U. would be equal to $\frac{550}{3{\cdot}44}$ watt-hours. From the last line of the table, it would be seen that with a modern electric heater it required 98 watt-hours to do the same work that had previously been accomplished with about 60 watt-hours. The electricians by adopting the new system rejected a large amount of heat; and so, calculating on the basis adopted by Professor Fleming, a gas-ring with an ordinary kettle would take 99 watt-hours, as against 98-watt hours with a kettle used with a separately heated electric stove—which amounts were, so far as energy was concerned, for all practical purposes equal. Comparing the modern electric heating apparatus with the Kwik gas-kettle, a rather higher efficiency was found in favour of gas. With the other electrical systems, they had to consider the high cost of upkeep, the heavy initial expense, and other troubles in connection with the electric apparatus. As Mr. Hewett had pointed out, the relative costs for energy might be calculated from the figures given. As to Mr. Ainsworth's question, if the current was continuous, and only one arc lamp was used on a high voltage circuit, it would need a resistance to make it workable, and this would perhaps take as much energy as the lamp, or perhaps more. As a matter of fact, if they put all the lamps in series that would be possible on the particular circuit, the consumption of energy would be precisely the same as with one lamp. The only difference would be that, with four or five lamps in series, almost the whole of the energy would be developed to give light; whereas where there was only one lamp a very large proportion of the energy would be wasted as heat in the resistance coils. If therefore the electrician could persuade the consumer to have more than one lamp they would cost no more for current, and he could supply these extra lamps for a small charge over that demanded for one lamp. But, of course, they must not exceed five 50-volt lamps on a 250-volt circuit. The point referred to by Mr. Eldred was a development of the simple alternating current alluded to in the paper, and consisted in having two, three, or more alternating currents in one distributing system. The separate currents were so arranged that they did not rise and fall together, but at equal intervals during the cycle. A good illustration was found in the single, double, and triple crank engines. In the case of a single-crank engine, the turning effort of the crank when the piston was at the extreme ends of its travel was *nil*—that was, they were dead-points, and it was the function of the fly-wheel to carry the crank over these points. For some purposes, however, a fly-wheel was inconvenient, as, for instance, in the case of a large marine engine; and for this and other reasons, two, three, or more cranks were used, and were arranged at various angles, so that when any one of them was passing over the dead-points the others were in the active position, and so a perfect continuity of turning effort was ensured. The single, two, and three phase alternating current corresponded to the single, two, and three throw cranks. On referring to fig. 5, it would be seen that the power was *nil* twice in each alternation—that was, there were two dead-points. If, however, another current was alternating in another phase, and therefore giving power when the first was powerless, there was a continuity of action and absence of dead-points.

The PRESIDENT (Mr. L. F. Tooth) said the paper had been a most interesting one. Gas people should certainly be acquainted with the elementary principles of their chief competitor. The lucid explanation they had had of the electric current would enable them, with a little careful study, to properly argue the question of advantages and disadvantages. The paper was bristling with points; and it should be of use, not only to their Association, but to other similar bodies. Personally, he had come across few men who knew anything about the principles of this competitor; and he thought it should be one of the first aims of everybody connected with the gas industry to make himself as familiar as possible with electricity.

SCOTTISH JUNIOR GAS ASSOCIATION.

Joint Meeting of Eastern and Western Districts.

On Saturday afternoon, the members of the Scottish Junior Gas Association, both Eastern and Western Districts, paid a visit to the Corporation Gas-Works at Airdrie. The attendance was most gratifying; there being fully 70 members from the Western District, and about 30 from the Eastern District. The visitors were received by the Convener of the Corporation Gas Committee (along with whom were several members of the Corporation), and by Mr. D. Vass, the Engineer and Manager of the works. Parties were made up, led by Mr. Vass, Mr. J. Cowie, of Lockerbie, Mr. J. Bell, of Kirkintilloch (both of whom were previously Assistants to Mr. Vass), and Mr. J. Robertson, the present Assistant.

First, the visitors were shown the method of hauling the coal-waggons along the high-level railway, by means of a wire rope wound upon a drum; the waggons being discharged by hand through shoots into the coal-store. Then they were shown the storage-tanks for tar and benzol, of 4000 gallons capacity each, and for acid, of 10 tons capacity. In the sulphate-house there was seen a Gillespie still, of rectangular design (this form being adopted because of its giving easier access for cleaning than square or round stills); a superheater of larger size than usual, on account of which great efficiency is claimed; and a saturator fitted with blow-forward steam connection. The sulphate plant is equal to a daily output of 2 tons. The coal-store, of a capacity of three weeks' supply at the time of maximum demand, is alongside the retort-house. In the retort-house the bench is a back-to-back one, with the main flue on the top of the generator floor, 4 ft. 6 in. below the retort-house floor, owing to trouble of draining at a lower depth. There are twelve ovens of sixes, and four ovens of eights—a total of 104 retorts. The hydraulic main is in one length, but divided by plates into three sections, each section being fitted with one of Cripps's valve to take off gas and liquid products into a 12-inch foul-gas main and a 6-inch liquor main, which run parallel with the hydraulic main. The gas from the 12-inch foul main passes into a 16-inch main, and then through a "P. & A." tar-extractor of a million cubic feet capacity. The gas then passes through the condensers, which are 12-inch pipes, 27 feet high, and of which two sets may be worked conjointly or in series, or singly, or by bye-passing. The tower scrubber is 6 feet square and 32 feet high. It is divided by a middle partition into an upward and a downward stream, and is filled with birch broom. There are two exhausters, of 50,000 cubic feet capacity at 80 revolutions, against 24-inch pressure and 4-inch vacuum. The exhausters are placed in a new building, in the upper flat of which are the laboratory, the photometer-room, and the drawing-office. The station-meter, erected by Messrs. Laidlaw, of Edinburgh, in 1897, has a capacity of 30,000 cubic feet per hour. Behind the meter is the benzol plant. The governor on the town pressure is fitted with Cowan's water-loading arrangement. Beside it is a booster of the positive type, to pass from 4000 to 12,000 cubic feet per hour, drawing the gas from the town main immediately before the town governor, and boosting into a special 4-inch main, which leads to a point ¾ mile from the works, and there operates on a diaphragm valve adjusted to give 6 inches of pressure at the outlet. There is a Holmes rotary brush-scrubber of a million cubic feet

capacity, fitted with "Western" valves; and there are three gas-holders, of 105,000, 68,000, and 620,000 cubic feet capacity respectively—nearly 800,000 cubic feet in all. The maximum daily output is 450,000 cubic feet.

Mr. VASS explained, with regard to the purifiers, that they were four in number, 16 feet square by 5 feet deep, with three tiers of grids, having a total depth of 2 feet of oxide in each box. Each box contained about 10 tons of oxide. They were controlled by a centre-valve arranged to work three on and one off. Till 1900, lime alone was used. There was considerable difficulty in disposing of spent lime, as the farmers only took it for about two months in spring, and would not look at it during the rest of the year. It was difficult to dispose of otherwise; and, as a consequence, they had to accumulate a great stock of the spent lime in their own works. Knowing the economy of using oxide, he resolved to try to employ oxide by utilizing the ground area hitherto required for the storage of lime as a revivifying floor. To begin with, they put in oxide and lime in alternate boxes; but finally they adopted oxide alone, revivifying in the usual way, by emptying the boxes and exposing the fouled oxide to the action of the atmosphere. Owing to the smallness of the revivifying floor, he resolved to try revivification *in situ;* and their first experiment was to draw in a supply of air through a sealed vessel at the inlet of the exhauster. Owing, however, to the variation in the exhaust, this did not prove very satisfactory. They also tried the same experiment at the inlet of the condensers; but there the vacuum was not sufficient to draw in the air. They next introduced a steam-jet injector, and measured the air drawn. They were then working on the old rotation—that was, putting the clean box on as the last box; and they found that the air assisted to a considerable extent in lengthening the period between the changes. But his desire was, if possible, to revivify material sufficiently in the box to get over the labour of having to discharge the box. With this end in view, he recently fitted up a large injector in such a manner that it could be applied to any one of the four boxes; and, in this way, they blew up the idle box by simply drawing the plugs. After the material had become partly saturated with sulphur, they found that the period between changes did not allow sufficient time to entirely revivify the box; and there was also the danger of spontaneous combustion if they tried to press in more air. Some experiments elsewhere, in alternately reversing the flow of the gas in purifiers, had given very good results; and this, with other things, led him to the conclusion that, while air in presence of a foul gas had only a very limited chemical effect in revivifying spent oxide, air in presence of a clean gas had a very marked effect. He then turned his attention to introducing the air at a point after the sulphuretted hydrogen had been removed. He did this by introducing the air always into the box which was the middle one of the series. This proved the principle to be correct. But they had some difficulties, on account of the variation in pressure, in working into different holders; and as they still had their injector arrangement at the condensers, they put this in action, and found that the air did its work of revivification quite as well by being passed forward in the stream of unpurified gas. In this way, their only foul box was the first in the series; and it occurred to him to place it in the middle, where revivification took place. This was done by reversing the manner of handling the centre-valve—putting the idle box, which was clean, on as the first in the series. This was the principle on which they were now working, and had been for the last seven years. The only improvement which they had made since then was the introduction of steam—first, by injecting steam into each box, a method which was finally discarded in favour of having a steam-coil for each box; and, secondly, by an arrangement which admitted of expansion of the material to overcome the pressure of the increased volume due to the absorption of sulphur, which gave a decided lateral pressure on the side of the boxes. The system of working was that in the first box the gas was deprived of sulphuretted hydrogen; that it passed into the second, which had previously been fouled, and cleaned it; and that it then passed through the third, which was the check-box. The fourth box was idle, and clean. The next day they put the gas into what had been the fourth box, making it the first one; the following day into the box which was first the previous day; and so on—one change at a time.

Tea was served in the Council Chamber to a company of over 120, which included, besides the visitors, a number of members of the Town Council.

Treasurer ORR, ex-Convener of the Gas Committee, presided, and, after tea, expressed regret at the absence of the Convener and the Provost, both of whom had intended to be present. The Convener had asked him, in his own name and that of the Town Council, to extend a very hearty welcome to the Association. He trusted that afternoon they had received some information which would be helpful to them. The Airdrie Gas-Works had undergone very considerable changes since they were acquired by the Corporation, about seven years ago. Those of them who remembered the works then would recollect that they were somewhat antiquated, and rather topsy-turvy in arrangement. This had been entirely altered. Their works, as they would see, were quite modern and up to date. During the past seven years, the Corporation had spent a considerable sum of money in improvements. The works cost them £64,000; and they had expended on them since, in various extensions and alterations, something like £25,000. The price of gas to ordinary consumers had been substantially reduced; and to prepayment meter consumers there had been a reduction of something like 30 per cent. This spoke volumes for the successful management of the works by Mr. Vass, and the able assistants he had had, some of whom were now occupying very prominent positions throughout the country. He was a profound believer that the gas industry had yet a great future before it. They were looking forward to extensive developments in the near future—especially in large cities and towns, where corporations were determined to tackle the smoke nuisance and the fog fiend. The fact that they had there so many young men who were interested in the gas industry proved that it had yet got a strenuous life. They might look with expectancy upon some of them bringing to bear their inventive genius upon the industry, and still further improving the production of gas and cheapening it to the consumers. He had a peculiar pleasure in occupying the chair that evening, from the fact that his esteemed friend Mr. J. Frazer, the President of the Western District, had some little identification with Airdrie, having been employed in the gas-works there thirteen years ago. There was also the significant fact that his respected friend Mr. W. Dunlop, the President of the Eastern District, was son of a gentleman who was highly esteemed and greatly beloved by the citizens of Airdrie.

Mr. J. FRAZER said it gave him great pleasure to come back to Airdrie and see the many changes which had taken place in the works. He wished to thank the Town Council for the hearty way they had received and entertained them. When he last saw the gas-works at Airdrie, they were a hovel compared with what they were now. Mr. Vass had a very difficult thing to face when he took over the Airdrie Gas-Works. What they had seen that day was the outcome of Mr. Vass's skill and ability; and he thought he deserved great credit for the way in which he had carried the work through. They would have noticed that a boosting plant had been introduced for the supply of Coatdyke with gas at satisfactory pressure. There had always been complaint with regard to the supply of gas in that end of the town which they could understand, as there was a difference in level between the two places of about 100 feet; and he need not speak to them about the difficulty there was in getting gas down there.

Mr. W. DUNLOP, on behalf of the members of the Eastern District, also returned thanks. Being a native of Airdrie, the gas-works there were naturally the first works he ever entered; and he could speak from experience of the change that had taken place in them. He was sure they would all agree with him that in Airdrie they had now splendid gas-works, which were in good condition. In the matter of purification, the name of Airdrie had become famous. It was quite a common thing to be told, when on a visit, that they purified the same as at Airdrie.

The CHAIRMAN acknowledged the vote of thanks.

Mr. JOHN R. MOYES (Edinburgh) proposed a vote of thanks to the officials of the Airdrie Gas-Works and others who had shown them round the works.

Mr. VASS returned thanks, and expressed his pleasure in seeing such a large turn out.

A number of songs and recitations made time pass pleasantly for a couple of hours. Then, on the motion of Mr. W. GEDDES, of Granton, a vote of thanks was given to the Chairman, and a similar compliment was paid to the gentlemen who had contributed to the entertainment of the company, on the motion of Mr. J. BELL, of Kirkintilloch. The singing of "Auld Lang Syne" brought to a close a most enjoyable gathering.

Mr. J. FRAZER, the President of the Scottish Junior Gas Association—Western District—states, with reference to his remarks upon Mr. Murray's paper on "Retort Settings and Gas Producers," that when he spoke he had two sets of figures before him, and that he quoted partly from one set, and partly from the other. He wishes his remark, as published in last week's number of the "JOURNAL," to be altered to: "If you take one retort per oven per annum, and multiply 60 by 45s., which is the price of a retort."

Midland Association of Gas Managers.—The annual general meeting of the Association will be held at the Grand Hotel, Birmingham, on the 2nd prox. According to the programme issued by the Hon. Secretary (Mr. Harold E. Copp, of West Bromwich), the business will include the presentation of the annual report of the Committee and the statement of accounts, the delivery of the Inaugural Address of the President (Mr. J. H. Brown, of Nottingham), and the reading of a paper on "The Fitting Department," by Mr. W. W. Townsend, of Hereford. From a synopsis of the paper which has been circulated, the author will emphasize the necessity of gas suppliers undertaking the sale and fixing of fittings and appliances for consumers, and will describe colonial experiences. He will contend that fittings should be fixed by the owners of the gas undertaking, so that their practical merits under working conditions may be discovered, and submit that canvassing and advertising are not equal to efficient service. Other matters to be dealt with are the supply of gas at high pressure from a special main; gas and air adjusters; the quality of fittings; packed and unpacked cooking-stoves; and the need for flues. Some particulars of the growth of business in Hereford, with charts of gas and electricity consumption, &c., will be given; and the author will conclude by showing that the price of gas and attention to the consumers are of equal importance. At the close of the meeting, the members will dine together.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Mr. Carr and the Standard Burner Bill.

SIR,—The extract Mr. Carr sends you from the minutes of evidence only supports my contention that nothing was done in the Committee's presence to establish a comparative figure for the No. 1 "London" and the No. 2 "Metropolitan" argands.

He himself says his observations were not proper tests, and that he did not put them forth as proper tests. They were his observations just as he could pick them up during the explanation of the apparatus.

My difference with Mr. Carr is that he should put forward such improper tests as establishing anything; forgetting that accuracy is as essential in an expert witness as truthfulness.

CHARLES CARPENTER.

South Metropolitan Gas Company, Feb. 25, 1911.

Convection v. Radiation.

SIR,—Whenever Mr. H. J. Yates either lectures or writes on matters connected with heating by gas, he is entitled to, and always receives, our most respectful attention. His words make a special appeal to our understanding, coming as they do from one who combines, in a very happy manner, the varied experiences of the practical man of business with the thoughtful philosophy of a broad-minded scientist. This being the case, it jars upon one to find that Mr. Yates has his little idiosyncrasy, in common, perhaps, with all strong men who have done much original pioneer work. It appears as if convected heat were a perfect bogey to him. Whether he writes or whether he lectures, he seems unable to avoid running a tilt at this particular manifestation of thermo-dynamics. This little idiosyncrasy (one can scarcely call it harmless) was especially noticeable in the very interesting paper recently read by him before the Liverpool Engineering Society. Unfortunately, he was not speaking to gas men, or he might have been taken to task on the spot. He was speaking to practical business men, upon whom his words would have a great, and possibly a lasting, effect, to the detriment of our business in one special branch of heating.

The paper falls naturally into three parts. As the third part deals, n the main, with hot-water supplies and high-pressure apparatus, it is not germane to the subject, and need not be further discussed. But the first part consists of a long jeremiad against heating by convection and a pæan of praise in favour of radiation; while in the second part the author makes a complete somersault and cannot say too much for convection. In other words, Mr. Yates begins by saying: "Have nothing whatever to do with any make of gas-stove which gives forth convected heat." Later on he says, in effect: "Use any style of gas-stove which, from its very nature, can only evolve convected heat, but call it a radiator." There is much magic in words.

Here are reproduced a few statements taken from the paper in question, of which certain parts have been italicized by the writer: "Of these two forms of heat, radiant heat is now *recognized by all scientific authorities to be by far the more healthful for ordinary domestic apartments.*" "Further, it is possible to *sit in a room heated by convection and yet feel chilled.*" "The new types of gas-fire that have brought about so great a change in the attitude of the public towards this form of gas heating, are, frankly, radiation fires. . . . *Consequently, they do not dry or unduly warm the air.*" "This wide-fire departure has the further advantage of enabling the largest living-room to be heated by gas—*a thing quite impossible with the narrower gas-fires.*" "The ideal gas-fire for domestic use must give the highest possible percentage of its heat in the form of radiation, and what heat may be unavoidably given off by convection should be at as low a temperature as possible, *instead of the high-temperature convection, which is the cause of all the discomfort in the less scientific types of gas-fire.*"

Now, these are serious statements to make, and may easily result in prejudicing the public against the use of a particular class of gas-fire. Let us see if they have any foundation in fact.

We are told that a domestic gas-fire which warms an apartment by convected heat dries the air of the room. [One presumes, of course, that Mr. Yates is speaking of a gas-fire connected to the chimney by a flue.] And many of us have possibly seen the pan of water in front or on top of a gas-fire, slowly evaporating its contents into the atmosphere of the room, in order, as the occupant fondly believed, to correct this undue dryness. But can Mr. Yates or anyone else explain how air taken into the stove at floor level, passed over or about the hot surfaces of the casing, and discharged into the room again a couple of feet higher, can have become dried? What has happened to the water vapour which was undoubtedly in the air when it entered the stove? It cannot have been absorbed by the hot metal of the casing; nor has it entered the chimney by the flue. Might one suggest that it, as well as the air containing it, were both heated in their passage through the stove, and that the vapour is still in the atmosphere of the room, and that the air of the latter is neither drier nor moister than it was before, though considerably warmer?

Undoubtedly this dry feeling is frequently experienced in a domestic apartment warmed by gas; but it is always due to the air being overheated. The fire is giving out both radiated and convected heat (assuming the stove to be one of the bad, old-fashioned kind condemned in such a wholesale manner by Mr. Yates), and giving it out at a constant maximum. Whereas a coal-fire is constantly rising from a minimum, after coal has been added, to a maximum, when the fuel is incandescent, then falling again to the minimum. These are points frequently overlooked by the occupant. "The warmer the air, the more it absorbs the moisture from the skin and mucous membrane," are Mr. Yates's own words; and so the occupier, instead of turning down the tap of the stove, and incidentally reducing his gas bill at the same time, flies to a pan of water to counteract the effect of the warm air.

The statement that a large living-room cannot possibly be heated by one of the narrower gas-fires must not be taken seriously. The writer is at present sitting in a room measuring 14 ft. by 12 ft. by 10 ft. high on the ground floor. It has a bay facing north, one window of which is fitted with a false bottom. This is always left in for the sake of ventilation. The room is lighted by means of one inverted burner, and heated by a gas-fire which is a combination of radiator and convector (if one may use such a word). The flue is connected to a good chimney on an outside wall; but the fireplace is not sheeted up. The month is February, and the air is just comfortably warm, though the tap of the gas-fire is only turned on one-quarter.

But, it may be asked, how can we explain the undoubtedly keen demand for the shallow and wide gas-fire, practically giving off "the highest possible percentage of its heat in the form of radiation"? Mr. Yates may perhaps say that it is because the British public is scientific enough to know that the radiant fire is the best article for domestic heating. Such a reason, however, would be rather too complimentary to the British public, which, without being the "hass" Mr. Bumble considered it, is certainly not scientific.

The popularity the shallow gas-fire is enduring at present is due to several causes. In the first place, when firms like Messrs. John Wright and Co., and others, put a new article on the market, their energetic and silver-tongued agents and canvassers are not going to let it lag for lack of pushfulness. Secondly, the men of Athens of old times were not the only ones who were always running after something new. And, lastly, one readily admits that the shallow gas-fires now being turned out are artistically perfect. They are made to harmonize with any form of existing fireplace, and present an appearance that captivates the heart of Mrs. Bull. Whether the subsequent gas bills resulting from the use of certain types of these fires will equally captivate the purse of Mr. Bull, is a point on which the writer has his doubts; believing, as he does, that manufacturers are making a mistake in sacrificing everything at the altar of radiant heat. Furthermore, the average Britisher detests stoves. He will have fires, or the similitude of fires, till the collector presents his account.

In his paper, Mr. Yates claims to have obtained a radiating effect, or efficiency, of 55 per cent. He admits that 25 per cent. of the heat developed escapes by the flue, and is necessary for the purpose of creating a draught. There is still a balance of 20 per cent. to be accounted for. Might not some of this elusive 20 per cent. be usefully returned to the room through the channel of convection? In other words, manufacturers would consult their own interests and the interests of the public generally (not to mention the gas concerns on which both depend) by attempting a compromise, and adopting the words "radio-*cum*-convecto" as their motto, instead of the words "radio-*sans*-convecto."

NOTA BENE.

Feb. 22, 1911.

Publicity Campaign.

SIR,—There seems to be a general feeling that the launching at any rate of the Publicity Scheme is a partial failure. It has been repeatedly stated during the past week that the whole scheme is likely to fall through. The magnitude of such a disaster, should it occur, cannot at the moment be estimated. Renewed and strenuous efforts are being made at present by electrical competitors in a manner never before resorted to. Apart from this comes an attack on gas by Professor Delepine during the course of a lecture in Manchester. This is a particularly insidious method, and emphatically a case in point for joint action. A copy of his statement, together with a reply, is enclosed, which you may or may not consider of sufficient general interest to publish.

As the stumbling-block appears to be the attitude taken towards the scheme by provincial corporations owning gas-works, let me attempt briefly to put the position seen from the corporation point of view, as it occurs in Middleton and doubtless many other places.

The Corporation own both the gas and electrical undertakings. The Gas Department flourishes; the Electricity Department, the reverse. Why spend money on a profitable to fight an already unprofitable business? Again, why such a large sum stipulated over a term of years? This year's Gas Committee cannot guarantee next year's payment. And what certainty is there that such a general scheme is going to be of benefit locally. Money is asked for a maintenance scheme, show-room, &c.; so if there is any advertising to be done, why not make it fit in with the particular needs of the town. Much criticism might be indulged in regarding the inauguration of the scheme; but to sum it up, What Manchester thought all along, London will think to-morrow, or at all events sooner or later. The position in the North, for some mysterious reason, has been utterly lost sight of.

However, it is of no use crying over spilt milk; and the only question that can now arise is that of the best remedy.

Probably the greatest inducement that could be held out to corporations for subscriptions would be not an attack upon electrical enterprise but upon the smoke abatement problem. After all, the field for development of gas for heating purposes is practically untouched, whereas that for lighting has been almost fully exploited.

It would be necessary to issue a fresh appeal based on this, together with that of the old subject-matter in the circular, and direct it to heads of corporation departments. A statement with regard to the position of the scheme—such as definite and provisional promises of support already received—would be of distinct advantage in placing the matter before the gas committees. The old rate of contribution as a suggestion might be adhered to, with the proviso that any less sum would be gladly accepted.

In conclusion, the apathy so far displayed by many managers must be shaken off, and the scheme supported by every means in their power, which would at least turn the balance between prospective failure and comparative success.

What is dependent upon this effort is difficult to realize, for such an opportunity may be long before it comes again.

C. F. BROADHEAD.

Middleton Gas-Works, Feb. 25, 1911.

[ENCLOSURES.]

Extract from the "Manchester Daily Dispatch," Feb. 22.

PERILS OF GAS.

"It seems to me very strange," said Professor Delepine, lecturing in Manchester last night, "that, knowing as they should know that ordinary coal gas is at the best a product dangerous to health, gas

engineers should not hesitate to make it more dangerous still by adding to it as much water gas as they dare, and by abandoning methods of purification which remove other dangerous vapours. They forget that much of the gas which enters our houses is not burnt, and that the only barrier between the consumer and the poisonous gases is the plumber's work."

Letter to the Editor of the "Manchester Daily Dispatch."

Sir,—In your issue of the 22nd inst., Professor Delepine is reported as having said, during the course of a lecture in Manchester: "It seems to me very strange that, knowing as they should know that ordinary coal gas is at the best a product dangerous to health, gas engineers should not hesitate to make it more dangerous still by adding to it as much water gas as they dare, and by abandoning methods of purification which remove other dangerous vapours. They forget that much of the gas which enters our houses is not burnt, and that the only barrier between the consumer and the poisonous gases is the plumber's work."

The present seems an age of sensational statements; and had the above emanated from one of the usual privileged places whence we expect such nonsensical rubbish, it could have been ignored. But coming as it does in the form of a lecture, it is likely to be extremely mischievous. It is the old, old story of a little knowledge being a dangerous thing. Perhaps the following facts will help to reassure the learned Professor.

The Chairman of the Committee of the Society of Medical Officers (reported in "Public Health") said: "No member who had experience of their meeting-room under the old conditions could deny the improvement that had taken place since gas had been substituted for electric light, and the new system of heating and ventilation had been installed."

According to the Board of Trade returns for 1910, only one town out of every ten in the United Kingdom possesses a water-gas plant; and even in these towns the quantity of water gas added does not average 10 per cent. On the other hand, in Canada one town out of every four is supplied entirely with water gas alone.

As every one per cent. of the dangerous vapours alluded to occasions a decrease in the gas equal to one candle power, the financial loss accruing alone prevents inefficient purification.

Most gas undertakings now inspect consumers' internal fittings before fixing a supply; so the remarks *re* plumbing work may be dismissed.

Gas committees and boards of directors are fully cognizant of the excellent methods of hygienic gas lighting and heating now in vogue, and the education of the consumer is proceeding fairly rapidly. But statements like those in question are calculated not only to retard progress, but do considerable harm to the industry.

Middleton Gas-Works, Feb. 24, 1911. (Signed) C. F. Broadhead.

The Efficiency of Gas-Boilers for Domestic Use.

Sir—I notice in your last issue a letter on the above subject from Mr. T. Potterton, containing several statements, with reference to a part of my paper on "Coal Gas as a Fuel," which seem to call for notice. I am sorry that this will compel me to refer to certain boilers by name, which in my lecture I was careful to avoid for the sake of absolute impartiality—a course I should have much preferred to continue had your correspondent's way of dealing with the matter left this possible.

Your correspondent condemns my tests as being done with "the tank-system." He is under a misapprehension. They were made with the usual cylinder storage and the necessary connecting flow-and-return pipes; and I had thought this was made sufficiently clear in my paper.

He states: "It is found that the use of gas for domestic hot-water service is too expensive for continuous consumption, and it is the practice for consumers to use the gas for short periods at a time." It is astounding that a maker of gas-consuming apparatus should make a statement calculated to be so seriously damaging to the gas industry. But however justly that statement may apply to his own apparatus (and to that extent I shall not differ from him), it is happily quite without general justification. To say that gas for domestic hot-water service is too costly for continuous use, is to rule that use of gas entirely out of court, for domestic hot-water supply is practically useless unless it be available all the time. If a heater has to be lighted up and the hot water waited for, then there is an end of one of the chief claims of gas-heated supply—viz., its superiority over solid fuel in the matter of convenience and absence of need for attention. That such a constantly available night-and-day supply can be economically assured, is a matter of design of apparatus and of an efficient thermostat; and, fortunately, as I was able to show in my paper, apparatus embodying these points are already in general use. If your correspondent had carefully read my paper, he would have found that the reason why users of his separate boiler-and-storage system find it too expensive for this necessary continuous use is the large amount of gas that has to be burned to maintain the system at the working temperature of 140° to 150° Fahr.—a fatal defect which, characteristically, his short tests carefully avoid disclosing. In one of the diagrams shown when my paper was read, it was indicated that the boiler starts with a consumption of 85 cubic feet of gas per hour, and can only maintain the average temperature of the 20 gallons of water at 146° Fahr. by burning about 12 cubic feet of gas per hour after cutting down. This boiler actually is your correspondent's "Victor" No. 13. This large consumption will necessarily deter many people from using the apparatus continuously; and so they will forfeit the convenience of having hot water always ready, and will only use the apparatus occasionally, as your correspondent suggests. The case is entirely different, however, with the combined boiler-and-storage system, with a consumption, when lagged, of only 2·2 cubic feet per hour, or, unlagged, of 5 cubic feet to maintain the temperature at 150° Fahr. These highly economical results obtained with the combined boiler-and-tank apparatus make it abundantly clear that, so far from your correspondent's belittling of the use of gas for household hot-water supply being correct, properly designed gas-heated boilers can be, and have for years been, used with conspicuous economy.

As regards the idea embodied in your correspondent's boiler with its primary heater, this is, of course, by no means a new thing. Our Eagle Range Works have probably had wider and longer experience than most people in hot-water practice, and we have experimented with boilers on this principle for years—indeed, long before your correspondent's boiler appeared. Although a primary heater was more or less of a success with solid fuel, the difficulty has hitherto been to get equally good results with gas as a fuel, and that under all the various conditions which obtain in continuous domestic use; and the failure of the primary heater is conspicuous in the diagram referred to, the boiler being your correspondent's "Victor" No. 13—where, after 75 minutes' working, it actually becomes a cooler instead of a heater. (Incidentally I may remark that none of your correspondent's tests seem to last more than 75 minutes.) The next diagram shown illustrated the action of one of these experimental primary-heater boilers which I made a considerable time ago. When cut down to the minimum of 9 feet, its primary heater continues to be really a heater (unlike your correspondent's apparatus where, under similar conditions, the primary heater becomes a cooler). But notwithstanding that it is, therefore, so great an improvement on your correspondent's boiler, I did not consider it good enough to place on the market, and have continued my experiments, with the result that I have now been able to construct a boiler which offers substantial advantages even over this, and which will shortly appear on the market.

Having disposed of your correspondent's sweeping charge against what I believe to be one of the most promising uses of gas both now and in the future, I come to his statements as to efficiencies.

Your correspondent complains that in my tests water was not drawn off, and claims that in his tests he adheres to ordinary working conditions (as a matter of fact, he only mentions drawing water in regard to two out of his seven tests). It is precisely his drawing-off of water—along with other points I shall refer to presently—that vitiates his test. The more water you draw off, the more you cut down the temperature of the system, and so the higher the nominal efficiencies. Indeed, if you went even further, and left the tap open and the water running away all the time, you would get water at a very low temperature, but you would probably get 100 per cent. efficiency, as you do in a calorimeter.

The tests given by your correspondent are stated to be under ordinary working conditions; but, besides this point I have just raised, I find that his tests appear to have been made and completed within a period of 1¼ hours from cold, which, obviously, does not represent the actual conditions of continuous working, but is based on the idea that the boiler is only to be lit when hot water is wanted. Your correspondent must be well aware that tests over such a short period are not merely useless, but entirely misleading; and so soon as the tests are taken under average conditions of continous working, there come into operation the three inevitable losses of heat set forth in my paper, which render an efficiency percentage of anything approaching 90 per cent. a scientific impossibility with such an apparatus. It is very difficult to deal with the tests he cites; the statements being so extremely slipshod and incomplete. For some reason, so important a factor as the various calorific values of the gas used in his different tests is omitted. A clue is found in an incidental reference to 426 "units" as 82 per cent., from which I calculate that in that particular test the gas used was 520 B.Th.U. per cubic foot. Obviously, this is a net figure. In my paper I pointed out how misleading it is to calculate efficiencies on net calorific values without this being plainly stated; but notwithstanding this, your correspondent leaves us entirely in the dark. Then in some tests he states—though only inexactly—what he conceives to be the percentage of efficiency; in others, he leaves this out entirely. Further, as regards the first two tests, he states no time whatever.

Considerations of space make it impossible to deal with all his tests in detail; nor, indeed, is it necessary, because the same fallacies run through all. I will take his test No. 6 because it refers to his own "Victor" boiler No. 1, which he states circulates 14 gallons of water per hour. He gives the temperature of the flow-pipe at various times during his short tests, but this is not a definite average temperature of any body of water. The mere statement of the temperature of the flow is of no value for calculation of efficiency unless the quantity of water at that temperature is stated. To show how absurdly it would work out otherwise—at 6·5 the temperature is raised to 50° Fahr., which would give an efficiency of 2620 "units" per cubic foot, or with gas at 520, 504 per cent.! At what stage, then, in this procession of temperatures does the stated temperature of the flow-pipe represent the average temperature of the whole tank? Your correspondent evidently imagines that this is the case at the end of the hour, because he bases his calculation of efficiency on this. But the well-known inevitable difference in temperature between the return and the flow, of course, makes this assumption absurd, either at that stage or at any other; so that his statement of the efficiency at the end of the hour is entirely misleading. This is further proved by the fact that at the end of the 15 minutes after the hour there is no further rise in the temperature of the flow-pipe, which shows that the return could not have been at 172° Fahr.—the temperature of flow-pipe—at the end of the hour. But assuming, for the moment, that this impossible figure were not only possible but correct, and taking the result for the whole period of his test—*i.e.*, from 6 to 7.15—then the efficiency would be not 455 but 364 "units" per foot of gas used. Taking the net calorific value of the gas at 520, this would mean 70 per cent. efficiency; and calculated on the gross value, which is the only correct way, this would give, at a usual difference of 10 per cent. between gross and net calorific values, 63 per cent., which is only slightly over the maximum possible efficiency of this type of boiler under continuous working conditions as set forth in my paper. But as this 63 per cent. is based on a figure of his which I have shown to be impossible, one can imagine how far below that maximum the actual result must have been.

Your correspondent proceeds to discuss the subject of thermostats, and says that in instances where the thermostat begins to cut down the gas immediately the temperature starts to rise, this is due to either incorrect placing of the thermostat or insufficient diameter of flow-pipe, "presuming the particular valve referred to is of satisfactory pattern." I quite agree that the valve used in my test was not a satisfactory pattern; but it was your correspondent's own valve, fixed and sent out by himself on the boiler, which was his own "Victor" boiler, and with

flow-pipe of diameter to suit the connections placed by himself on the boiler.

Your correspondent then goes on to admit that with apparatus of his type, which does not lend itself to lagging, there is a loss of heat which requires a bye-pass flame burning 8 to 10 feet (our tests make it considerably more) to compensate for it. This is where the combined boiler-and-tank system, which can easily be, and indeed is often supplied, lagged, is so much more economical with its 2·2 cubic feet as cut down by the thermostat to maintain the temperature. Where there are towel or linen rails to be heated, and therefore constant circulation is necessary, any thermostat is inadequate which cannot instantly, and without further adjustment, regulate the consumption, as is done by the non-capsule thermostat indicated in the fifth diagram accompanying my paper.

His remarks on the reversal of flow drew my attention to the report of my paper as it appeared in the "JOURNAL," where I find that, owing to a misprint, I was made to say "there is reversal of flow," while, of course, what I actually said was "there is *no* reversal of flow;" and that being so, your correspondent's remarks on that head naturally fall to the ground.

I might take all his other statements and refute them in the same way *seriatim;* but enough has been said to show the utterly fallacious and absurd results which your correspondent has managed to produce by his selecting an inadequate test period, and then getting hopelessly astray in a maze of figures.

The tests set forth in my paper were not prepared under carefully selected conditions to produce results favourable to any one apparatus, or unfavourable to others, but were the result of numerous tests taken with the most scrupulous accuracy and impartiality, and under actual conditions of continuous working, so as to arrive at data of definite scientific value. To do otherwise is only futile; and in such matters there is nothing more essential than strict and conscientious accuracy.

Aston, Birmingham, Feb. 23, 1911. H. JAMES YATES.

Coke-Oven Gas Developments.

SIR,—I was very pleased to read the article on this subject in the last issue of the "JOURNAL," as I think I read into it a sort of suspicion on your part that sufficient attention has not been paid to this method of carbonization in England, either by our gas engineers or by the Technical Press. In spite of the work of such men as Mr. E. Bury and others, very few connected with the production of town's gas seem to give more than a passing notice to coke-oven facts and figures. I should like any of your readers, who read this letter, to impress themselves with the fact that the figures given below are quite incontrovertible; and I venture to say they themselves will acknowledge the suppositions to be easily practicable.

We have a battery of 50 Simon-Carvès ovens which is paying handsomely. The quantity of coal carbonized per 24 hours is 245 tons, value 4s. 6d. per ton; and the coke made per 24 hours is 170 tons. The daily production of gas is 2¼ million cubic feet, of 14-candle power and 540 B.Th.U. gross. The larger portion of this gas is used for heating the ovens, part is burnt (not at all economically) under boilers, and the rest is allowed to escape into the air.

Now, there is absolutely no reason why coke-ovens should not be heated with producer gas as easily as ordinary retorts; and assuming the consumption of fuel to be one-third the total make of coke (value at ovens 12s. per ton), this would cost (170 ÷ 3) × 12s. = £34 per day. To this could be added £6 per day for interest, depreciation, &c., on the producers. That is to say, we could supply 2½ million cubic feet of gas ready for lime or oxide purification at a cost of less than 4d. per 1000 cubic feet.

I think you will agree with me that figures like these are worth the fullest consideration by all interested in the production of gas of satisfactory quality at the lowest possible price.

G. W. MARSHALL, Manager of Coke-Ovens.

Dinnington Colliery, Rotherham, Feb. 23, 1911.

Gas-Meter Exchanges.

SIR,—Allow me to place before your readers a suggestion with regard to the changing of dry gas-meters on the district, principally in connection with the removal of tenants and the changing of meters where the gas companies and corporations have to cater for two classes of consumers—viz., ordinary and prepayment.

There are some who object to the purchasing of ordinary meters, and yet there are times when they have to face an abnormal demand for them, especially in Scotland, where there is an annual removal term. Taking Glasgow as an example, 40,000 removals were reported as having taken place last year; thus throwing a large amount of work on the Gas-Fitting Department. It follows as a matter of course that there must have been numbers of exchanges at the term time between the two classes of consumers—that is, ordinary consumers removing to houses where prepayment meters are fixed, and *vice versâ*.

Where the purchasing of ordinary meters is an objection, I would suggest that prepayment meters should be purchased and fitted on the district, even where ordinary meters are required; and if a consumer comes to a house desiring to be supplied with gas by the ordinary meter, it is only necessary to throw the change-wheel out of gear, open the prepayment valve, and you have an ordinary meter. Should the next tenant wish a prepayment meter, the change-wheel can be readily readjusted, as either of these operations need not occupy more than a few minutes.

A number of objections may be raised to this suggestion; the chief one being the extra cost of the meter. But what is the extra first cost compared with the loss sustained by frequent meter exchanges? Moreover, the removal of meters is attended with the risk of damage to the meter externally and internally when being transferred to and from the Gas Department; thus necessitating the repair of the meter, which means additional cost.

To my mind, the cost of the meter exchanges would outweigh the extra cost of the prepayment meter and the conversion as described, quite apart from the repairs which might have to be undertaken.

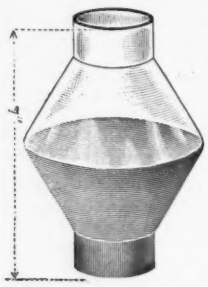
It will give me pleasure to know if I have opened up a question of interest to some of your readers; and I shall be glad to hear the other side of the question.

Meter-Repairing Department, Glasgow, Feb. 24, 1911. JAS. GRANT.

Globes for School Lighting.

SIR,—With reference to your issue of last week, containing an account of the meeting of the Illuminating Engineering Society, *re* the "Lighting of Schools," we should like to make a few remarks with regard to globes for school lighting, as it is evident that neither Dr. James Kerr nor Dr. Harman is aware of the existence of our opal and flint globe for incandescent burners (designed expressly for schools), of which there are thousands now successfully in use. These globes are designed to give the greatest diffusion of light, equally distributed over a given area.

The globe is so shaped as to distribute the light at the correct angles, and is so arranged that the opal is at the bottom to prevent the glare of the intense rays of light striking the eyes of the children, while the top portion of globe is left clear, so as to maintain an even light in the upper part of a class-room without shadow. The angles of light are thereby reflected from the ceiling line and walls—thus keeping the maps and charts hanging on the walls well illuminated, and at the same time protecting the eyes from the glare of light by the obscured portion of the globe. [See sketch.]



Furthermore, a disadvantage in the globes made in the form shown in Dr. Harman's paper is that they catch and retain the dust on the clear bottom portion of the globe, as it is well known that a large amount of dust is always floating and settling in school-rooms. In this way, the amount of light must become less; but it will be seen that the dust cannot accumulate in the same proportion in the globes herewith described in our designs.

It is needless to add that the globe is made adaptable to inverted burners.

Charles Street, Hatton Garden, E.C., Feb. 27, 1911. A. E. PODMORE.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Ashborne and District Gas Bill, Chapel-en-le-Frith, Chinley, and District Gas Bill, Chesham and District Gas Bill, Chester Water Bill, Enfield Gas Bill, Luton Gas Bill, Luton Water Bill, Sidmouth Gas and Electricity Bill, Whaley Bridge Gas Bill.

The Warrington Corporation Bill, suspended from last session, was brought from the Commons last Tuesday, read the first and second times, and committed.

Petitions have been presented against the following Bills:—

Ashborne and District Gas Bill, by the Ashborne Urban District Council.

Bedwellty Urban District Council Bill, by the Gelligaer Urban District Council and the Blackwood Gas Company.

Chapel-en-le-Frith, Chinley, and District Gas Bill, by the Buxton and Yeardsley-cum-Whaley Urban District Councils and the Whaley Bridge Gas Company.

Chesham and District Gas Bill, by the Hertfordshire County Council, the Chesham Urban District Council, the Chesham Electric Light and Power Company, and the Rickmansworth and Uxbridge Valley Water Company.

Chester Water Bill, by the Denbigshire and Salop County Councils the Birkenhead, Liverpool, and Wrexham Corporations, the Llangollen and Whitchurch Urban District Councils, the Chester, Chirk and Oswestry, Edeyrnion, Hawarden, Malpas, Overton, and Tarvin Rural District Councils, and the Dee Conservancy Board.

City of London (Various Powers) Bill, by the Metropolitan Water Board, the South Metropolitan Gas Company, and the London Hydraulic Power Company.

Ely Rural District Water Bill, by the Cambridge County Council, the Ely Urban District Council, and the Newmarket Rural District Council.

Harrogate Corporation Bill, by the Knaresborough Urban and Rural District Councils.

Hastings Corporation (Water and Finance) Bill, by the Battle Urban District Council.

Kingston-upon-Hull Corporation Bill, by the East Riding County Council, the Cottingham Urban District Council, the Beverley and Barmston Drainage Commissioners, and the Holderness Water Company.

Luton Water Bill, by the Hertfordshire County Council and the Luton Corporation.

Merthyr Tydfil Corporation Water Bill, by the promoters of the Rhymney Valley Water Board Bill.

Metropolitan Water Board Bill, by the Corporations of London, Kingston-upon-Thames, Maidenhead, and New Windsor; the Berkshire, Hertfordshire, and Surrey County Councils; the Staines, Eton, Walton-on-Thames, Wembley, and Weybridge Urban District Councils; the Eton and Cookham Rural District Councils; the Stanwell and Wyrardisbury Parish Councils; the Woking Water and Gas Company, and the Colne Valley, Rickmansworth and Uxbridge Valley, Slough, and West Surrey Water Companies; and a number of private petitioners.

Rhymney Valley Water Board Bill, by the Rhymney and Aber Valleys Gas and Water Company, the New Tredegar Gas and Water Company, the Merthyr Tydfil Corporation, and the Llandaff and Dinas Powis Rural District Council.

Sidmouth Gas and Electricity Bill, by the Sidmouth Urban District Council.

Slough Urban District Water Bill, by the Eton Rural District Council and the Slough Water Company.

Swansea Gas Bill, by the Swansea Corporation, the Swansea Rural District Council, and owners and occupiers of property in Swansea.

Whaley Bridge Gas Bill, by the Buxton and Yeardsley-cum-Whaley Urban District Councils, the Chapel-en-le-Frith Rural District Council, and the Chapel-en-le-Frith, Chinley, and District Gas Company.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Chasetown Gas Bill, Gloucester Corporation Bill, London, Brighton, and South Coast Railway Bill, London County Council (General Powers) Bill, West Cheshire Water Bill, and Wirral Water Bill.

The Bicester Urban District Gas Bill, Chesterfield Gas and Water Board Bill, Chichester Gas Bill, Gaslight and Coke Company Bill, Marple Urban District Council Gas Bill, and Tamworth Gas Bill have been referred to a Select Committee, consisting of Sir Harry Samuel (Chairman), Sir George Agnew, Mr. Lewis Boyle, and Mr. Goldstone; to meet on Thursday.

The Felixstowe and Walton Water Bill has been referred to a Select Committee, consisting of Sir Edwin Cornwall (Chairman, Mr. Godfrey Locker-Lampson, Mr. Charles Bathurst, and Mr. Esslemont; to meet on Thursday.

On Monday last week, Mr. Lansbury asked the President of the Local Government Board whether for some years past the Corporation of Birmingham, in carrying on their gas undertaking, instead of dealing with the moneys forming the sinking fund, as directed by their Gas Acts, had used them for other purposes; whether his Board had required the Corporation to replace such moneys in the sinking fund; whether such moneys had been so replaced, and at what rates and to what extent; and whether such sinking fund was now in order and invested as required by law. Mr. Burns replied that twelve years ago the Board drew the attention of the Corporation to the fact that certain moneys belonging to the gas sinking fund were not invested, but were being used in an unauthorized manner. As a result, the matter was put right; and he was not aware of any repetition of the irregularity.

On the same day, Mr. Burns stated, in answer to a question put by Mr. Remnant, that, in pursuance of an Order of the House, a return was being prepared relating to the water supply of every district in England and Wales. It would include information as to the quantities of water now being supplied in each district, and as to what further quantities could be supplied from sources at present in use, together with information as to the character and situation of these sources. He had also obtained the authority of the Treasury to the appointment of a geologist on the staff of the Department. He was not without hope of introducing a Bill giving effect to the recommendations of the Select Committee on the Water Supplies (Protection) Bill, 1910, and earlier Commissions.

LEGAL INTELLIGENCE.

The Dispute as to Cowdenbeath Gas Company's Shares.

In the Court of Session—Second Division—on the 18th inst., judgment was given in the case of Alexander Waddell, gas engineer, of Dunfermline, and Forbes Waddell, Manager of the South Queensferry Gas Company, Limited, against James Hutton, cashier, of Edinburgh, in which pursuers sue for £1010 which they say they would have made had they had, as they were entitled to have, allotted to them 101 of 300 new shares of the Cowdenbeath Gas Company, Limited. In the Outer House, Lord Ormidale ordered proof. Lord Ardwall reviewed the circumstances of the case, which have been recorded in the "JOURNAL," and said that at this stage it was not necessary to decide finally any of the questions raised before the Court, as something might turn upon the manner in which the allotment of shares was made, the time at the disposal of the defender and pursuers for taking up the allotment, and other matters; while on the question of damages, it would remain to be seen whether the pursuers could have taken up the allotment of shares, and whether they were entitled to insist on the defender giving them a transfer therefor. He was of opinion, however, that, on the record as it stood, there was a relevant case to go to proof, and that they ought to affirm the interlocutor of the Lord Ordinary. Lord Salvesen and the Lord Justice-Clerk concurred; and the order for proof was affirmed. The case goes back to the Outer House for proof; and the pursuers were awarded expenses in the Inner House.

Maidstone Gas Official Sentenced.

At the Kent Winter Assizes, last Thursday, before Mr. Justice Bucknill, Henry Hickmott pleaded guilty to a charge of falsifying the "Gas-Rental Summary Book" of the Maidstone Gas Company, in whose service he was engaged as Chief Clerk and Collector. The main facts of the case were given in the "JOURNAL" for Feb. 7 (p. 386). In laying them before the Judge, Mr. Pitman said that the prisoner had been in the service of the Company over thirty years; and the Directors, though they had instructed him to lay the whole of the matter before his Lordship, did not want to do more than it was their duty to do by placing the facts before the Court. He had stated these facts by their desire; and he wished to leave the matter entirely in his Lordship's hands. Mr. Clarke Hall, addressing the Court on Hickmott's behalf, remarked that, though it was perfectly true he had altered the accounts, the prisoner had himself received no benefits whatever. In fact, so far from putting something into his own pocket, he had, as the result of these transactions, been a loser. That was to say, though he falsified the accounts, he did so in order to cover up deficiencies for which he was not responsible. It had not been suggested that he had lived extravagantly or spent money on himself. Hickmott was a married man, and had children. His Lordship, having remarked on his painful duty in sentencing such a man as the prisoner, who had been placed in a position of trust and had borne a splendid character, said he would gladly, if he could, respond to the invitation of prisoner's Counsel to pass upon him a less sentence than he felt absolutely necessary to pass; but he must do what was right, and prisoner must be punished the same as other people. He (the Judge) could not bring himself to think it would be right to pass a less sentence than the one he was about to pass, and that was twelve calendar months' hard labour.

Water Supply to Factories.

In the Court of Appeal last week, before Lords Justices Vaughan Williams, Farwell, and Kennedy, an appeal was heard by the Metropolitan Water Board against decisions of the Divisional Court (composed of Justices Phillimore and Coleridge), by which a judgment of his Honour Judge Woodfall, at the Westminster County Court, that the water supplied to the business premises of Colley's Patents, Limited, in Bermondsey, was for trade and not domestic purposes, and that the Company were entitled to pay by meter, was affirmed. [The proceedings in the Court below were reported in the "JOURNAL" on Dec. 6 and 20 last year, pp. 727, 939.] It may be remembered that the water was mainly used for drinking, sanitary conveniences, and cleansing; and the appellants' contention was that the supply was for domestic purposes within the meaning of section 8 of the Metropolitan Water Board (Charges) Act, 1907, and that they were therefore entitled to enforce the statutory charge of 5 per cent. on the rateable value of the premises. At the close of the arguments, their Lordships delivered judgment. Lord Justice Vaughan Williams thought the appeal should be dismissed; but his learned brethren were of the contrary opinion. The appeal was therefore allowed. Our report of the judgments is held over till next week. It is rather curious that in the Divisional Court there was a difference of opinion between the two learned Judges; Mr. Justice Phillimore supporting the view taken by the County Court Judge, and Mr. Justice Coleridge upholding the contention of the Water Board. As usual in such circumstances, the appeal was dismissed. As a number of firms are concerned in the action, and they have behind them the London Chamber of Commerce, it is in contemplation to take the case to the House of Lords, if Colley's Patents, Limited, obtain sufficient financial support.

Twenty Years' Progress at Leighton Buzzard.

In the report for the year ending Dec. 31 last, which was adopted at the recent annual meeting of the Leighton Buzzard Gas Company, the Directors called attention to the fact that the reserve fund of the Company had now reached the authorized maximum. Since the Special Act of Parliament was passed in 1891, this fund had been raised from £570 to £2721, and the price of gas reduced from 4s. to 3s. 1d. per 1000 cubic feet. During the period of twenty years (1891-1910), dividends equal to 8 per cent. on the original stock were paid for eleven years, 9 per cent. for one year, and 10 per cent. had been paid for eight years. The total dividends paid had, therefore, been 23 per cent. less than the authorized amount. The Directors being no longer able to place the usual £300 to the credit of the reserve fund, proposed to take another 1d. per 1000 cubic feet off the price of gas, as from Jan. 1 last—equal to about £200 for the year, and making the net price of gas to ordinary consumers 3s. per 1000 cubic feet. They also recommended that a bonus of 30s. per cent. on the original stock, and 21s. per cent. on the new ordinary stock, be paid to the stockholders, amounting to £258. The Board intimated that they hoped to be able to continue paying this bonus while the price of gas was 3s. or less per 1000 cubic feet, and until the authorized maximum dividends had been paid. The revenue account showed a profit for the year of £2153. This amount, with £756 brought forward from last year's accounts, made a balance of £2909 standing to the credit of the profit and loss account. Out of this sum, the Directors recommended the payment of dividends at the rate of 10 per cent. per annum on the original stock, and 7 per cent. per annum on the new ordinary stock, also a bonus of 30s. per cent. on the original stock and 21s. per cent. on the new ordinary stock, less income-tax; amounting together to £1974, and leaving a balance of £935 to be carried forward to next year's account. At a subsequent extraordinary meeting, the Directors were authorized to issue an additional £1000 of new ordinary 7 per cent. stock. The accounts, which bore the signature of the Secretary and Manager (Mr. C. F. Ruggles), showed that 4680 tons of coal were used during the past year.

Newport (Mon.) Gas-Works Benefit Society.—The thirty-fifth annual dinner of this Society took place on Monday evening last week, under the presidency of Alderman Thomas Canning, the Engineer and Manager of the Newport Gas Company. Among those present were the Mayor (Mr. J. H. Williams), Lieut.-Col. A. H. Laybourne, a Director, and Mr. T. H. Hazell, the Secretary, of the Company. The Chairman, in welcoming the Mayor and visitors, congratulated the Society upon its continued progress, and upon its having taken up additional shares in the Gas Company, which paid them 5 per cent. He trusted they would continue this policy of becoming co-partners in the enterprise. The toast of "Success to the Newport Gas-Works Benefit Society" was proposed by Alderman G. Greenland, who expressed his pleasure at seeing the handsome contribution of the Directors to its funds. Mr. T. Donovan, the Chairman of the Society, responded, and gave details of the financial transactions of the year. He concluded by stating that the balance and reserve fund left in the Company's Thrift Society and the Post Office Savings Bank on June 30 last was £323.

MISCELLANEOUS NEWS.

KIRKCALDY GAS-WORKS PURCHASE ARBITRATION.

The hearing of evidence in relation to the transfer of the Kirkcaldy Gas Company's works, which was commenced in Edinburgh on the 9th ult. [see *ante*, pp. 107, 174, and 238], was resumed at the Surveyors' Institution last Saturday; having been transferred to London to suit the convenience of parties.

The Arbiters are: For the Company, Mr. CORBET WOODALL; and for the Corporation, Mr. ARTHUR SILVERTHORNE. They nominated Lord SHAW OF DUNFERMLINE as Oversman. Mr. NORMAN J. MACPHERSON, S.S.C., is Clerk to the Referee. The Company are represented by Mr. MURRAY, K.C., and Mr. MONCRIEFF (instructed by Messrs. Adamson, Gulland, and Stuart, of Edinburgh); and the Corporation, by Mr. CLYDE, K.C., M.P., and Mr. MACMILLAN (instructed by Messrs. Morton, Smart, MacDonald, and Proser, of Edinburgh, and Messrs. Martin and Co., of London).

Mr. *E. H. Stevenson* was recalled, and made a correction in his evidence [*ante*, p. 238].

Mr. SILVERTHORNE questioned witness with regard to his statement that he had never read a paper before the Gas Institute, and handed him a copy of the "JOURNAL" for June 16, 1896.

Witness: I had no recollection of it—I have none now; but I presume I did read the paper.

And in that you made a criticism of Dundalk. You told me that you had never heard the matter discussed.—I did not recollect it. I do not recollect it now.

I understand you withdraw everything now?—Certainly, so far as that I did not read the paper. I must have read it. Of course, it is difficult to remember a thing that happened fifteen years ago, especially when you have been very busy. What I said I said in perfect good faith.

The OVERSMAN: I am afraid if the Arbiters were asked what discussions we took part in in 1896, we should not go so far as you did, to say we did not do it; but we might say we had not the remotest idea.

The case for the Corporation was then continued.

Mr. *R. Cockburn Millar* was further cross-examined by Mr. MURRAY. Asked if his point was this, and nothing more, that had the accumulation of property been disclosed it might have led to competition in Kirkcaldy gas, witness replied that he did not know about competition, but he believed it would have led to a reduction in price. The Company kept their dividend down to 7½ per cent., and people believed it to be that; whereas in point of fact they were accumulating large funds, and getting a large dividend on them. Counsel remarked that, on the other hand, if it were the case that the Company were unfettered by the agreement of 1845, witness would agree that they were perfectly entitled to do as they did. Witness replied that he would agree that what happened in 1845 would have this effect at any other stage, when the true state of matters was disclosed, and that might have led to reduction.

Mr. MURRAY: Is it not the case that these accumulated profits which appear in the reserve and depreciation accounts, and upon which interest was allowed, were, in fact, just subscribed capital?

Witness: No; I take it to be the excess price charged for gas; it was capital subscribed by the consumers, not by the shareholders.

Whether subscribed by the shareholders or by the consumers, it was, in effect, treated as capital subscribed by one or the other, and interest allowed?—You must take it at what the fact is, that the interest was added to the reserve fund and depreciation account, and debited to the repairs of works. That is what I say is absolutely unprecedented.

In further cross-examination, witness was reminded that he had been giving evidence about maintainable profit and dividend; and he was asked if it was his view that the Corporation were paying upon the footing of dividend or profit. He replied that it was on the footing of maintainable profit; it was not dividend at all that he was concerned about. If he deducted the dividend in considering the price to be paid by the Company in the transfer, what he would do would be to enfranchise the payment of the Corporation from income-tax in future. Counsel reminded witness that he had totalled up the Kirkcaldy expenses of management to 1·94d. for 1909; but he might take it from him (Counsel) that in 1910 they totalled 1·98d., making an average of 1·96d. Asked if he said that this compared unfavourably with the similar management expenses of other concerns, he replied that all he said was that £50 to the Directors was entirely inadequate, and that the salary should be £200 at least. [The evidence-in-chief on this matter was very general.] Asked if he had ascertained whether similar undertakings had not costs as low, and lower, in respect to these specific outlays, witness said he had not gone into this. His knowledge suggested that the salaries paid the Directors were quite inadequate for a great undertaking of this kind. On being told that the corresponding figure in Paisley is 0·07d. and in Falkirk 0·04d., witness said they were Corporation undertakings. Asked if he did not agree that, in order to institute a fair comparison of price with other Scottish towns, it would be necessary to have a note of the varying qualities of gas in these towns, witness said he supposed it would, both as regarded purity and illuminating power. He acknowledged that his comparison did not contain any such consideration; but it was a material factor. Speaking as an accountant, his comparison was accurate. He could not give the relative illuminating power of the gas in Glasgow; but he agreed that it was material.

Mr. MURRAY: Have you made any inquiry as to the relative costs of production, of raw material, coal, and so on? Is that also material evidence?

Witness: No doubt. Well, I do not know that it is for the purpose of the table I have produced. That table is designed to compare the prices at certain dates, and it shows how the price is kept up. We know in Kirkcaldy that the candle power of the gas has come down enormously; so as regards that town I do not think it unfair. It is irrespective of conditions.

Now, about the capital of the Company and the maintainable profit. You take £32,003, and you have 7½ per cent. on it; so that represents £2400 4s. 6d. per annum. What is your purpose in making that calculation? Do you suggest that the figures which you there set forth—£48,000 and £35,754—are any guide to the tribunal as to the amount which is to be paid for this concern?—Yes.

Very well. Take your £35,000 figure. Can this concern be carried on with a capital like £35,000?—It cannot.

Do you seriously suggest that £35,000 has anything to do with the figures the tribunal have to ascertain?—No.

Does that £35,000, if it is of any value to the tribunal, include the liquid assets of the Company?—No.

There are £11,000 liquid assets, and taking these away, how many years' purchase is that on the gross profit of the Company? Is it something between three and four years' purchase on the present profit?—Yes.

Is that not absurd?—£35,000 includes the whole undertaking.

The resultant price is £24,000, leaving between three and four years' purchase on the 1910 profit. It is absurd; and you seriously suggest that?—I seriously suggest that the people who started this concern in 1828 were content to limit themselves to a certain dividend; and had they done so it would have remunerated them fully for all they were entitled to get, if they properly adhered to the original terms.

Do you consider the Kirkcaldy Gas Company would be able to compete against the Kirkcaldy Corporation?—The Company voluntarily agreed to sell; but they could have refused.

And what would have happened?—Well, the compensation clauses are pretty heavy on corporations. The Company might have been allowed to continue to supply gas if they sold it at a cheap price.

But would there have been fair conditions of competition between the Company and the Corporation, with the rates at their back?—It is not for me to say whether fair or unfair.

I want an answer, yes or no?—I would rather not answer the question.

Mr. WOODALL: Suppose the Corporation started competition, what would be the position of the Company in regard to opening the roads?

Witness: They would require to make a bargain with the town.

Mr. MURRAY: What qualifications have you to offer an opinion on the matter of the number of years' purchase, and the figure which should be adopted as the multiplier?

Witness: I have had a large experience of kindred matters. My evidence here has mainly been connected with the suggestions derived from the financial tables. I quite admit there are many circumstances which fall to be taken into account in determining the multiplier other than the mere financial aspects. I do not think you will find that I have given any expression of opinion that the multiplier in this particular case should be so-and-so. I say the table here is deduced from certain authoritative sources which point in a certain direction.

Then may I take it that you do not express any opinion as to what ought to be the multiplier in the case of either a statutory or a non-statutory company?—No; not quite. I have given the tribunal the benefit of my experience.

And when you say the multiplier ought to be three or four years less than 17½ or 16½, do you mean that that is a pure deduction from certain figures which you produce, and nothing more?—Yes; and I produce them in order to help as much as I can in ascertaining the figure.

In further cross-examination, witness stated that in the Dunfermline case liquid assets were taken into account in the multiplier. The Corporation in that case had to pay £11,904 in regard to these assets; but they contended that they ought not to have to pay this. The award was against them; being determined on documents produced.

Replying to Mr. SILVERTHORNE, witness said the subscribed capital was £32,003. He had never heard of the premiums being liable to dividend. The Company had been paying in the shape of dividends from 1898 to 1907 the sum of £3675. The subsequent amounts were £4896 in 1908, £4900 in 1909, and £5553 in 1910. Asked if there was nothing else but a difference of £100 between these dividends and what would be allowed upon the subscribed capital and the surplus profits treated on the 5 per cent. basis, witness said that was so.

The OVERSMAN: I gather you are distinctly of opinion that there should be about three years taken off the value of a non-statutory company as compared with a statutory one?

Witness: Yes; that is the lowest.

With regard to your view on the history of the Kirkcaldy case, I took it to be as strong as this—that there was due to the citizens a reduction of the price, and that this ought to have been granted by the Company from a sense of honour and uprightness; and you hold that they were guilty of wrongful appropriation by the shareholders?—Yes.

Replying to further questions, witness said that their wrongful appropriation began in 1866. He was aware the Company's stock had changed hands a good deal. If there had been depreciation of the concern in consequence of wrongful appropriation, he thought it just to visit the existing shareholders with the result of it. Asked how many years he thought they ought to be penalized, witness said he suggested they should get 20 years off the dividend they ought to have got had they charged a proper price for gas, which would have yielded 7½ per cent. on the actual money paid in on the agreement of 1845. If they had got this, they would get only £35,000, and the Corporation would get everything.

The OVERSMAN: If they were paid upon 17½ years, which you reduce their profits to in respect of their being non-statutory, will you tell me how much that would amount to?

Witness: That depends how much you take as maintainable profit.

If you take it as £6550?—That is taking the biggest year. On that basis it is £114,625.

And the figure you think they should get?—£35,754; a difference of £78,871.

You hold that the Kirkcaldy Corporation are entitled to acquire from the existing shareholders of the Kirkcaldy Gas Company this undertaking at £78,871 cheaper than they would even on your own calculation, solely because in former years, according to your views, there was a failure to make reductions in price due to consumer?—Yes.

Mr. *W. R. Herring*, in reply to Mr. CLYDE, said he had examined the buildings and plant of the Kirkcaldy Gas Company. The works and plant were in quite a fair state of repair for a going concern, taking into account the fact that they required to be refitted out of profits from time

to time. There were one or two exceptions to this. The buildings were in a good state of repair for the purpose they were serving, except the roof of the coke yard. The plant was on a congested area; and having regard to existing requirements, the arrangement was not good. Since 1906, the Company had rebuilt one of the retort-benches, removed their exhausters, and placed new engines in a new house. They had also enlarged the works connections in some parts, and bought additional property. The general tenour of his report was that alterations would require to be made, and that works would have to be added and extended. The Company were not at present providing for the consumers an adequate supply. He had prepared a comparative statement of the output from Dec. 15, 1909, to Jan. 5, 1910, as compared with the period from Dec. 14, 1910, to Jan. 14, 1911. The system of increased pressure was applicable to the latter period. The result showed that between the two periods there was an increase on the make of 4·6 per cent., an increase on the output of 5·1 per cent., and a bulk increase on the make of 883,000 cubic feet and on the output of 980,000 cubic feet. The increase in pressure which had been made at the last moment was 50 per cent. more than during lighting hours. In 1909, the minimum was 14·9, the maximum 19·1, and during lighting hours 16·1. The minimum pressure now was 18·1, the maximum 27·7, and during lighting hours 24·1. He did not admit that the pressures were yet sufficient. There was no doubt that the changing of the pressure brought about a new state of conditions necessitating an increase of plant. The maintainable profit of £6500 was based upon the old conditions; but it could not be maintained, because a great deal of it would be needed to meet the changed conditions of the supply. The make of gas per ton of coal had been steadily going down since 1905. While in the December period of 1905 the make per ton was 10,087 cubic feet, in 1910 it fell to 9903 cubic feet. The quality of coal used was a factor in this. The Pathhead holder was in the wrong part of the town, and one of much greater weight would have to be built in order to give the required pressures. There were four coal-stores, one of which had accommodation for 726 tons, the second for 620 tons, and the fourth for 240 tons; the third being used as a shed. The condensers at present in use were only just sufficient for normal working. Too great a strain was accordingly sometimes put upon them. The cost of materials used in the purifiers increased every year; and at the time of maximum production there was too great a strain upon the purifiers. The unusual strain occurred at certain times; and this must necessarily derange the whole scheme of operations. He could not realize why in 1909 the Company required a station meter with a capacity of 1,920,000 cubic feet actually fitted with a 29-inch pipe. This meter was large enough for a works with three times the present output. Such a meter would cost £845 new to-day. The workshops and stores and the works fittings department were very cramped. He was of opinion that the Company had absolutely neglected to maintain and repair the plant and the road surface. There was not the slightest doubt that increased leakage would be the result of increased pressure in the circumstances. In 1905, and up to 1906, the union jet burner was used in ascertaining the illuminating power in Kirkcaldy. The Company claimed credit for supplying gas of 26-candle power. In 1905, 26 candles was the power; in 1906, 25 candles; in 1907, 24 candles; in 1908 and 1909, 23 candles. In 1909, however, the 23 candles was ascertained by a different test-burner. The consumer, he understood, lost more than he ought to have lost had the Company been sufficiently frank to inform the public that they were changing their method of testing. The drop in 1909 was a very material drop to the people who used the flat-flame burner as before. He did not suppose for a moment that it was wrong to lower the candle power; but the Company should have taken the public into their confidence.

Monday, Feb. 27.

On the resumption of the proceedings this morning,

Mr. *Herring* continued his evidence for the Corporation. He said the Kirkcaldy Gas Company paid 13s. 5d. per ton for coal, compared with 10s. 6d. per ton paid in Alloa, Falkirk, Perth, and Dunfermline. The Company also made less on residuals. They paid 3s. per ton carriage on coke to Edinburgh, and then sold it at 1s. per ton less than the market rate. The high price the Company charged for gas kept the consumption down. He had valued the works as a going concern, and could only allow scrap value for No. 1 gasholder, which was useless. No. 2 had depreciated by £500; and No. 3 by £600. The mains had depreciated by 33 per cent., and he had depreciated the meters by 20 per cent. His valuation of the Company's undertaking, at 21 years' purchase, was £80,430, but from this he made deductions which brought down the total value to £79,457. His valuation was much below the claim of the Company. Taking into consideration its position, Parliament might have insisted upon a compulsory clause directing that dilapidations should be made good out of dividends, as was done in the Stirling case. The Company carried on business as a lighting, power, and fuel Company. If they had no authority to carry on the businesses of fuel and power supply, the reduction in the profits would amount to £857 18s. 11d.

In cross-examination by Mr. MURRAY, witness admitted that he had not had great experience as a valuer in cases like the present; it having been more in the direction of parliamentary work. He had, however, frequently valued gas undertakings both for companies and for corporations.

At the close of yesterday's proceedings, a fuller report of which will appear next week, the inquiry was again adjourned.

Mitcham and Wimbledon Gas Company.—At the half-yearly general meeting of this Company to-day, the Directors will report a gratifying expansion in all branches of the business, including a satisfactory increase in the sales of gas, in the six months ended Dec. 31 last. The accounts show that the total revenue was £71,629, and the expenditure £60,331; leaving £11,298 to go to the profit and loss account. The amount available for distribution is £18,202; and the Directors recommend the declaration of the statutory dividend under the sliding-scale of 5½ per cent. per annum, less income-tax.

COMMERCIAL GAS COMPANY.

The Ordinary Meeting of the Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW in the chair.

The SECRETARY (Mr. H. D. Ellis) read the notice convening the meeting; and the Directors' report and the statement of accounts were then taken as read.

TRADE PROSPERITY.

The CHAIRMAN, in moving the adoption of the report and accounts, said: The year 1910, with the latter half of which our accounts deal, was a year of great national prosperity. The aggregate figures of our foreign trade reached the enormous total of 1213 millions sterling, or about 10 per cent. over the figures of the previous year, and nearly 4 per cent. above the previous highest record, which took place in 1907. I think I am justified in saying that all our home industries and factories, with one exception (the building trade), were during the year in a flourishing condition. In this general prosperity, the poor industrial district which we serve shared to some extent, no doubt helped by the building of the Dreadnought "*Thunderer*" at the yard of the Thames Iron-Works Company. The construction of this ship employed some 3000 men, whose aggregate weekly wages amounted to no less than £7000. I believe the keel of the ship was laid in the middle of April, 1910; and, as you are aware, she was launched on the 1st of this month. So that during the nine months of her construction something like £273,000 was added to the wages of the East-end of London. We can well understand how this large sum, expended in the district, must have brought plenty and comfort to many a home where otherwise there would have been want and distress. I am sure all of us who are interested in the welfare of the East of London must hope that the successful fulfilment of their contract by the Thames Iron-Works Company will lead to their having a constant participation in the orders for ships which the Admiralty may have to place from time to time.

PARTICIPATION IN PROSPERITY—COAL TROUBLES AND IMPROVEMENT.

You will find in our accounts, I am happy to say, signs of the general prosperity to which I have alluded. Our sales of gas have risen to the extent of 3 per cent.; and we have obtained good prices for our residuals, especially for coke and sulphate of ammonia. I like to attribute, and I am quite sure I am justified in attributing, this increase in our sales to the stimulus afforded by the reduction of 2d. per 1000 cubic feet in the price of gas, which, as you will remember, took place from July 1 last. This year has been a prosperous one for the Company—I think I may say the most prosperous in its history. And it would have been still more profitable for us if it had not been for the high price we had to pay for coal when making our contracts in the spring of the year. At that time the coal trade was suffering from the coming into operation of the Mines (Eight Hours) Act, which came into force in Northumberland and Durham on Jan. 1—six months later than in other parts of the country. Directly the colliery owners attempted to inaugurate the three-shift system of work in place of the two-shift system per diem which had been in force before, they came into conflict with their men; and most of us bear in mind the disastrous riots which took place at the Horden pits, where one of the Company's contracts was placed. The Company suffered to a minor extent by the delays which took place in loading our ships; but the heaviest damage occurred to us by the abnormally high price we had to pay for coal. Subsequent events showed this high price to be entirely unwarranted by the requirements of the trade of the country. The prices of coal fell three months after we made our contracts, and continued to fall until they reached their lowest points at the end of the year. The consequence was that we paid considerably more for our coal than we ought to have done. The Board have taken advantage of favourable offers which have been made to us by some of the Company's contractors; and we have already bought a portion of our coal for this year's requirements at considerably reduced prices.

PORT OF LONDON DUES.

The six months with which our report deals will always be memorable in the history of the Company because it marks the end of the period during which we have been privileged to bring coals into and through the Port of London without charge. The schedule of charges fixed under the authority of the Port of London Act is now in force. The maximum charge has been fixed at 3d. per ton of coal; but the actual charge in force at the present time is 1d. per ton, which involves us in an annual payment of some £833. I regret to say that, from this payment, I do not see how we are to benefit either directly or indirectly.

ASSESSMENTS AND EFFECTS.

Quinquennial assessment took place last year, and our properties have been re-valued for assessment for the payment of rates. This is always an anxious time for the Board; and it involves very heavy and disagreeable work upon the chief officers of the Company. I am happy to say—thanks to the industry and ability of our Engineer (Mr. Stanley Jones) and our Accountant (Mr. Bradfield), upon whom the bulk of the work fell—we have come fairly well through this assessment. But in some cases our assessments have been raised; and so our rates will be affected. This burden of the rates is a very serious thing, both for the Company and for the consumers in our poor district. Last year the charge upon us was no less than £25,500; and this is very nearly equivalent to 2d. per 1000 cubic feet on the price of gas. I think you will agree with me this is a great deal heavier than it ought to be. [Hear, hear.]

GAS HEATING AT THE ROYAL MINT.

These are some of the difficulties that have had to be met during the past year, and have had to be overcome. I suppose difficulties in the affairs of life are not an unmitigated evil, because they impel us to more strenuous and vigorous efforts to attain success in spite of them; and I think we have had a pleasing and useful example of this during the past six months. We were very anxious to quote to the authorities of the Royal Mint such a price for gas that they could melt the metals of which the coinage is composed more advantageously with gaseous than with any other form of fuel. There was no difficulty

whatever in melting the metals of which our English coins are composed—gold, silver, and copper. But when it came to the melting of the nickel of which some of the Colonial coinage is composed (nickel is a very hard metal, and only melts at high temperatures), the ordinary gas-furnace was found to be inadequate for the purpose. This, however, has now been overcome. The Mint is now making a very extended use of the Company's gas; and we hope the time is not far distant when they will use it in preference to all other forms of fuel. When you get your dividend warrant, and cash it at the bank, you will be able to look at the sovereigns in your hand, and say, "Commercial gas made, in a double sense, these sovereigns." [Laughter.]

STEADY PROGRESS AND GOOD WORKING.

Turning to the accounts, if we have nothing very startling or very novel to tell you about our domestic affairs, what we have to tell you is wholly gratifying and satisfactory. Our accounts are eloquent of steady progress and good working results. By the revenue account it will be seen that the balance of profit amounted to £72,980, which is £2382 more than in the corresponding half of 1909; and this in spite of the fact that the Company were charging 2s. 4d. per 1000 cubic feet for gas, as compared with 2s. 6d. in the second half of the previous year. The contributing causes of these good results are to be found principally, though not exclusively, under three headings. First of all, under the heading of coals. Coal cost us less by £2115, although we made 51 million cubic feet more gas than in the corresponding half year. I ought to draw you attention to the fact that, under the heading of coal, oil is included, because, as a matter of fact, coal cost more, and the saving is wholly on oil. We made a considerable saving under the heading of oil; and we shall make a still better saving this year. Carbonizing wages cost £11,200, which is actually £2283 less than in the corresponding half of 1909. Those of you who know about gas affairs will appreciate that this is a very satisfactory reduction indeed; and it speaks volumes for the skill of the Engineer and his staff, and for the good work performed by the men. This item of expenditure has been reduced every half year now for a considerable number of years. Ten years ago, we were paying 3½d. per 1000 cubic feet of gas in carbonizing wages. To-day we are paying only just over 1½d. per 1000 cubic feet. And while the cost of carbonizing has gone down, the make of gas per ton of coal has gone up as regularly, until this half year we have reached a make which I think is a record for this Company. We have realized the large make of 12,396 cubic feet per ton of coal carbonized. I should like to congratulate the Engineer upon this very successful work, which reflects the highest credit upon him and upon his staff. Then the third item which has come to help in the half year is that of coke. The receipts from coke are no less than £4981 more than they were in the corresponding half year. Gas, however, has produced less by £7236. This is entirely owing to the lower price which has been charged for it. When I state this, I think I have really drawn your attention to the salient points of the accounts; and I will not weary you by going into details.

PROFITS AND DIVIDENDS—FURTHER REDUCTION FORESHADOWED.

Turning to the net revenue account, we have the satisfaction to-day of proposing for your acceptance an increase in dividends at the rates per annum of 5s. 4d. per cent. on the old stock, and 6s. 8d. per cent. on the 3½ per cent. stock. This will raise the dividends to the rates of £5 9s. 4d. per cent. on the 4 per cent. stock, and to £5 6s. 8d. per cent. on the 3½ per cent. stock. You will remember that eight years ago we multiplied our 4 per cent. stock by two-and-a-half, and our 3½ per cent. stock by two. Therefore the equivalent rates of dividend on the unconverted stocks would be £13 13s. 4d. per cent. on the old stock (as we used to call it), and £10 13s. 4d. per cent. on the new stock. The effect on our profit and loss account will be as follows: Our balance of profit for the half year is £72,980; and the debenture interest and interest on temporary loans together amount to £8415, which leaves £64,565 to be added to the amount available for dividend. The dividends I have mentioned will absorb £56,296; and this will leave a surplus profit for the half year of £8269. We brought forward £43,763; and we shall carry forward an undivided profit amounting to £52,032. A reduction of 1d. per 1000 cubic feet of gas costs the Company, on the present sales, the sum of £6972 per half year. Having regard to the surplus of profit for the present half year, and to the large sum of undivided profit that we are carrying forward, it would appear as if the time is not far distant when we shall be able to announce another reduction in the price of gas. If so, we are convinced it is the right policy for the Company; and we shall welcome the opportunity of carrying it into effect. While I am talking about dividends and the price of gas, I would like to express the satisfaction the Directors feel that the profit-sharing bonus of our employees has also risen. It now amounts to 6 per cent. per annum on their earnings; and it cost the Company £3296 this half year, or £513 more than in the corresponding half. But on the repeated testimony of the Engineer and Station Managers, I can assure you that this is money well spent. It is well spent if only for this reason, that it has taught our men that they are really cared for by their employers; and it has taught them this further lesson, that their best interests are bound up in the prosperity of the Commercial Gas Company.

Mr. WALTER HUNTER (the Deputy-Chairman), seconding the motion, joined emphatically in the congratulations to the Engineer and his staff on the excellent results of the half year.

The CHAIRMAN, replying to an inquiry, said the next reduction in the price of gas (if of 1d. per 1000 cubic feet) would enable them to pay an additional 2s. 8d. per cent. on the 4 per cent. stock and 3s. 4d. per cent. on the 3½ per cent. stock.

The motion was unanimously carried.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, dividends at the rates per annum of £5 9s. 4d. per cent. on the 4 per cent. stock and of £5 6s. 8d. per cent. on the 3½ per cent. stock were declared, both less income-tax.

Mr. FREDERICK GREEN moved the re-election of the retiring Directors (Messrs. W. G. Bradshaw, W. Hunter, and R. Y. Bevan).

Mr. H. W. GELL having seconded the motion, it was heartily agreed to.

The retiring Auditor (Mr. G. W. Ilsley) was reappointed on the motion of Mr. WILSHAW, seconded by Mr. YOUNGS.

Proposed by Mr. M'NAUGHT, and seconded by Mr. WILSHAW, a cordial vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN, having responded on behalf of himself and his colleagues, moved a similar vote to the staff and employees of the Company, coupling it with the names of Mr. Stanley Jones and Mr. Ellis. Regarding the employees, he could give the assurance, based upon the reports of the officers, that the men did work most harmoniously and most willingly for the Company. The good results the accounts showed would be impossible of achievement were it not for the willing work of the men. He had alluded in past years to the success of the profit-sharing scheme; and he had done so again that day. He could not understand how it was that employers of labour in the country did not see from those who had adopted the scheme how enormously successful it had been. It had entirely changed the relationship between employers and employed on this Company's works. It was a source of gratification to go to the works to see how cheerfully the men were working and obeying the orders of their superior officers. They did realize that in doing good work for the Company, they were also doing good work for themselves, and that was the spirit and feeling that ought to exist. Mr. Stanley Jones had done excellent work for the Company; but it had been arduous during the last six months. To him and Mr. Ellis, and to those who worked with them, they expressed their hearty appreciation.

The DEPUTY-CHAIRMAN seconded the motion; observing with regard to profit-sharing that not only did it do good to the Company and to the employees, but it encouraged among the latter the spirit of thrift and independence, which was of the greatest possible value to the men personally.

The motion was heartily carried.

Mr. ELLIS acknowledged the vote for himself and his staff. Speaking of the prosperity of the concern, he said that not only had this Company been prosperous during the past half year, but nearly all gas companies had been the same. Generally, the position of the gas industry had shown a wonderful vitality. In fact, the continued prosperity of gas companies appeared to have given umbrage to some of their friends the electricians, who were so pained at the almost indecent tenacity of life exhibited by the gas industry (which they fondly believed was some time ago moribund) that they had not hesitated to publish statements in regard to gas—especially in regard to comparative costs of gas and electricity—which were, to put it very mildly indeed, rather difficult to reconcile with the ascertained facts. [Laughter.] Angry people did sometimes make statements they could not justify; but he thought they might let it go over at that, and not take any notice of it, but continue on the path of prosperity calm and undismayed.

Mr. JONES, on behalf of himself and staff and the employees, thanked the proprietors cordially for their expression of appreciation and encouragement. The work of the officers was made easier by the loyal support and enterprise shown by the Company's employees as a body; and it would be quite impossible to present the returns they had done this last half year if they had not all pulled together. They had attained very high results in the past half year; and they were hoping to maintain them, but he thought that it would be difficult to surpass them.

LIVERPOOL UNITED GAS COMPANY.

The Agreement with the Corporation.

The Half-Yearly Meeting of the Company was held last Tuesday, at the Offices, Duke Street—Mr. H. WADE DEACON presiding.

The CHAIRMAN, in moving the adoption of the report, said they had had an estimate of the working prepared; and though it was not the practice to submit figures at the half-yearly meeting, the Directors were justified in declaring the usual dividend. The general results were satisfactory. There had been an increase of 2·3 per cent. in the quantity of gas sold; and he was glad to say that an increased consumption had been general, both among ordinary private consumers and the users of automatic meters. The very mild winter had not been favourable to them as sellers of gas; and the mild weather since Christmas had not helped them. Since the August meeting, there had been some changes in the *personnel* of the concern. The retirement of the Secretary (Mr. P. F. Garnett) took effect at the end of the year. He had been Secretary of the Company for a very long period, and had seen many changes and given valuable advice and assistance during his tenure of office. The Directors appointed to succeed him his son, Mr. Theodore Garnett, who was conversant with the working of the concern, and in whose general ability the Board had every confidence. The resignation of the Treasurer (Colonel J. F. Robinson) also became effective at the end of the year. He had devoted great services and ability to the advantage of the Company for a long period. The Directors had appointed as his successor Mr. E. Upton, who was the Borough Accountant of the Bootle Corporation; and they felt sure that they had the right man in the right place. There had been many changes in the *personnel* of the Company during the last few years. Not long ago, Sir Edward Lawrence retired from the chairmanship, which he had held for 23 years, to the great advantage of the Company. Mr. William King, who had been their Engineer for a long time, also retired; and he was succeeded by Mr. Edward Allen, who was an Engineer in whom they had the greatest confidence, and to whose labours they looked with even greater confidence in the future. Under the old officers, the Company had been very successful, and had paid the shareholders regular dividends; and he hoped that under the present management the concern would be none the less successful. Times changed rapidly; and they must look for some change in the future. They had keener competition than ever before. The improvement in electric lighting was a great factor for the gas manager; for the electric current not only produced light, but had the effect of sharpening the wits of the engineers and others connected with the gas industry. He did not fear for the future of the Gas Company from this point of view. There would be new methods introduced; and it was only natural that, in a large concern of this kind, methods of working and organization should from time to time be changed. Such changes would be very carefully thought out, and not introduced without full

discussion by the Directors. The object which they had always in view was to reduce the price of gas, and at the same time, as far as possible, satisfy the reasonable requirements of the employees of the Company, the shareholders, and the consumers of gas. At the August meeting, he expressed the hope that the Standard Burner Bill, which was then awaiting the third reading in the House of Commons, would be passed. A deputation of the Directors had an interview with representatives of the Corporation; and an amicable agreement was arrived at under which the threatened opposition was withdrawn. The Bill had now become an Act of Parliament. The Company agreed that, while the new burner was to be the standard, the illuminating power of the gas should not be reduced below 18 candles as tested in the flat-flame burner, and that for two years from March 31 next the price of gas should be reduced by 2d. per 1000 cubic feet, subject to an increase or further decrease of 1d. per 1000 cubic feet if the price of coal rose or fell 1s. per ton. The price, therefore, for two years from that date, subject to the condition named, would be 2s. 3d. per 1000 cubic feet to the ordinary consumer and 2s. 10d. to the user of an automatic meter. This reduction of 2d. per 1000 cubic feet was not entirely due to the introduction of the new burner. The reduction of cost by lowering the illuminating power by 2 candles was, roughly speaking, ½d. per candle, or 1d. per 1000 cubic feet. The other 1d. the Directors reckoned to save by a reduction in the cost of manufacture. Indeed, as a result of the improved methods of manufacture now fully in operation, a reduction of 1d. would in any case have been made in the selling price. He was glad also to report a settlement of an old outstanding question between the Corporation and the Company as to the lighting of back passages; and he wished to express the appreciation of the Directors of the friendly spirit in which their deputation was received by the Corporation.

Mr. J. E. TINNE, in seconding the adoption of the report, said it was the ambition of the late Engineer to be able to sell gas at 2s. 6d. per 1000 cubic feet. They were now below this figure; and he was not sure that finality had been reached in the reduction of price.

The report was adopted; an interim dividend of 5 per cent. on the "A" stock and 3½ per cent. on the "B" stock was declared; and the Chairman and Directors were thanked for their services.

WANDSWORTH AND PUTNEY GAS COMPANY.

Lowest Price in Metropolitan and Suburban Area—Congratulations from Proprietors.

The Half-Yearly General Meeting of the Company was held last Tuesday, at the Offices, Fairfield Street, Wandsworth, S.W.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. CHARLES W. BRAINE) read the notice calling the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said it would be seen from the former that the Directors recommended dividends at the statutory rates per annum of 8½ per cent. on the "A" stock, 6¾ per cent. on the "B" stock, and £5 15s. 6d. per cent. on the "C" stock. These were an increase of 2s. 6d. per cent. on the "A" and "B" stocks and of 1s. 9d. per cent. on the "C" stock; the increase following on the reduction in the price of gas made last Christmas twelve months. This was really the cream of the transactions of the past half year. But there was another portion of cream in the report, where it said: "The Directors are pleased to announce a reduction in the price of gas—viz., from 1s. 10d. to 1s. 9d. per 1000 cubic feet from Christmas last." Believing as the Board did that the only avenue to good profits and good dividends was the low price of gas, he could tell the proprietors that the power to be able to do this was much appreciated by the Board when they saw the accounts for the half year. And he would only be misleading the proprietors, and not be doing justice to the Company, if he were not to tell them that this was a wise thing to do, when the dividends recommended in the report could be paid, and when he had the satisfaction of assuring the proprietors that further increase would follow. The essential thing before dividends were increased was that the upkeep of the works and plant generally should be good; and that was a matter about which he and his colleagues were very jealous indeed. Therefore the profits had been well earned. It would have been possible to have shown a larger balance if they had thought fit to load-up the capital account. But the Directors had not done this. Looking at the capital account, it would be seen that the expenditure remained as it was last year, but for the addition of £7195 spent on land and £1160 on meters, stoves, and fittings, which, with a small sum deducted for depreciation on leasehold property, made a net increase of £8325. This was the index of whether they were on a safe road. There would have been no 1s. 9d. price for gas in their area if every year they had raised the capital by leaps and bounds. The question might arise as to why the Directors purchased the land. The explanation was this: When the Company went to Parliament a few years ago, the Directors did the bold thing of scheduling a lot of land that was at the time occupied by houses and footpaths, but which had a magnificent frontage to the Thames at present unoccupied. The Company agreed that the footpaths which intersected the land should be kept open until they had bought up the property. The Directors had been gradually nibbling at this land; and the £7195 was an investment that had been recently made in it, and it paid the good clear interest of nearly 5 per cent. It was not therefore a great burden to the capital account. And whenever they wanted to extend the works for any purpose whatever, the houses would be pulled down and the footpaths closed up; and they would then have a fine clear area of land, flanked by the River Thames. Another purchase had been made; but they had not yet put the money into the accounts. This was the purchase of M'Murray's Wharf, which bounded the gas-works, for the moderate sum of £8000; and they would get nearly 5 per cent. on the outlay from the rent and tolls. The dock was a most valuable addition to the site of the works, because they were able to get the ships conveying their coal right away from the North to the front of the works. They thus had now means for floating coal-stores, capable of being moved in any direction. But apart from them this dock would give them a water-way for barges right up the side of their works. A more valuable acquisition than this (seeing it paid through the rent the interest on its own capital), having regard to the facilities it would offer in the future, he could not conceive. The new facilities would improve their position; and then the price of gas would come down to 1s. 8d. He was rather boastful about the 1s. 9d., and the prospect of the 1s. 8d.; and the Board were proud of it. He did not want to make any invidious comparisons; but he could not refrain from pointing out that this was one of the smallest of the London group of gas companies. It all showed that Mr. H. S. Freeman, who was one of his colleagues, and one of his (the Chairman's) father's old pupils, did not waste his time when he was the Company's Engineer for so many years. Before leaving the question of the price of gas, he might mention that a penny reduction represented to the consumers no less than £4610; while the proprietors' share was only £440. The profit-sharers would also, through the reduction, get a still higher percentage of bonus. Turning to the working of the half year, he said the gas produced per ton of coal carbonized could not be said to be anything marvellous; but the fuel account was very small now—thus doing justice to the new furnaces put in by their Engineer (Mr. H. O. Carr). The amount of coke sold per ton of coal carbonized was now nearly 11 cwt.; so the working was good in that respect. The wages for manufacturing the gas were rather high, at 2⅜d. This was dear according to the present rule; but he was happy to say that in the next accounts there would in all probability be a saving of one-half of that, because they had installed, in addition to the fine furnaces, retort machinery which would soon remove the one reproach from their working. He thought they would easily save in the future about £2000 per half year in this direction, judging from some figures taken out by Mr. Carr since the new machinery had been in operation. They ought to have had some of the saving shown in the present accounts; but the machinery was not finished by the contractors until Christmas, instead of Michaelmas. Then the money paid for materials used, the returns for residuals, the costs of purifying, salaries, and wear and tear were all good for so small a Company. They had had no great law expenses, though they suffered a good deal from the Workmen's Compensation Act, which had increased malingering. Some time ago, the Board adopted a simple form of profit-sharing—a system which was due to the late Sir George Livesey, his friend of long years' standing. It would be seen that they had allocated from the half-year's profits £800 for distribution among the workmen and staff. They paid in the way of bonus on rather a high scale. Starting with a low price of gas, the Directors decided to give the men a high percentage bonus, which would be larger now that the price was a little lower. At the present price, the men received in bonus 7 per cent. This he thought was handsome; but his view was that, unless the bonus was good, it would not be effective. The result of the working was that the receipts amounted to £86,100, and the expenditure to £70,706; leaving a gross profit of £15,393. The business was still progressing. During the half year, they had connected up 532 additional consumers, and 769 stoves. The whole of the accounts and the position generally were a great triumph for their present Engineer and for their friend, Mr. Freeman, who put in the foundation for the present prosperity.

The DEPUTY-CHAIRMAN (Mr. T. A. Ives Howell) seconded the motion.

Mr. A. B. BOSHER complimented the Chairman and the Board and the officials on the excellence of the report and the position of the concern. For a London Company to be charging only 1s. 9d. for their gas, with 4s. to 5s. more to pay per ton for coal than some of the undertakings in the North who were charging more for gas, was something of which they might be proud. He was glad to see the Board proposed to raise the salary of the Secretary, whose heart and soul was in his work. He was a strong believer in liberal remuneration for the members of the staff of a successful Company, as well as for those who, as members of the Board, zealously looked after the interests of the shareholders. He also asked to be permitted to refer to the distinction that had been conferred upon the Company by the Board having co-opted such a distinguished soldier as Field-Marshal Sir Evelyn Wood as a Director.

The motion was unanimously carried.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, the dividends alluded to in the opening of the Chairman's address were unanimously agreed to.

The DEPUTY-CHAIRMAN moved the re-election to their seats at the Board of the Chairman and Mr. Freeman. He remarked that he did not know what the Board would do without Mr. Jones. who had been connected with the Company now between 40 and 50 years. He was always preaching the gospel of cheap gas; and everything that it was possible to do was done by their Chairman to produce gas cheaply. As to Mr. Freeman, he had been connected with the Company, in one capacity or another, for some 42 years; and it was quite true that much of their success was due to the foundation he put in now many years ago.

Mr. ERNEST L. BURTON seconded the motion; and, in doing so, said that all the proprietors must feel proud of the extraordinary position of the Company. He had been working out the percentage of residual products to the cost of raw material—coal, oil, and coke—and he found they got back no less than 72 per cent. of the cost from coke, tar, and sulphate of ammonia. He did not know whether this was a record; but he did know from his acquaintance with the figures of many companies, that it was an excellent result. He also complimented the Board upon the new land and wharf and dock purchases.

The motion was heartily adopted.

The CHAIRMAN, having acknowledged his re-election, said he had been remiss and inadvertently wanting in respect, in not having referred to the appointment of his friend Sir Evelyn Wood to fill the vacancy caused by the death of Colonel W. A. Jones. Sir Evelyn's election brought to their Board one of the finest brains in England, one of the highest toned gentlemen and business men he (the Chairman) had ever met. The proprietors would endorse the words, when he said that they had done well in bringing Sir Evelyn into their counsels. Reference had been made by Mr. Burton to the facilities possessed by the Company. He (Mr. Jones) was Chairman of a Company which would be only too glad if they had the facilities the Wandsworth Company

possessed; and they would be pleased if they could participate in some of these facilities by purchasing gas in bulk from the Wandsworth Company cheaper than they could possibly ever make it themselves. It would mean carrying the gas a long way. But this Company were anxious and willing to do what would be a great boon for their extensive district if it were at all possible. He (the Chairman) hoped the day might come when he would have to call the proprietors together to ratify some such scheme. As to the residuals, he also mentioned that they had on previous occasions obtained through the residuals as large a percentage of the cost of the raw material as on this occasion. Regarding the remuneration of their officers, they were not negligent of them. They had raised the salary of their Engineer by £100 from Christmas last; and now they were about to ask the proprietors to increase the salary of the Secretary by a like sum from the same period.

Moved by Mr. J. C. POTTER, seconded by Mr. R. P. W. RENEAU, Mr. Bernard Hennell, A.C.A., was appointed to succeed his father (who retires) in the Auditorship, in conjunction with Mr. Burton.

Mr. JOHN HENNELL thanked the Chairman and the Board, the officers, and the proprietors for the uniform kindness he had received during the many years he had been Auditor.

Mr. B. HENNELL, the new Auditor, heartily thanked the proprietors for his election.

Proposed by the CHAIRMAN, and seconded by Mr. BIRD, the salary of the Secretary was increased by £100 from Jan. 1 last. It was mentioned by the Chairman that Mr. Braine had now been with the Company for fifteen years.

The SECRETARY acknowledged the vote; remarking that he was proud to hold the office he did in the Wandsworth Gas Company, which led the way in so many directions.

Mr. WALTER HUNTER moved a vote of thanks to the Chairman and Directors, and congratulated them upon being in the position to sell gas at 1s. 9d. per 1000 cubic feet.

Sir FORTESCUE FLANNERY seconded the motion, associating himself with all that had been said as to the splendid management of the Company. With regard to the adoption of profit-sharing, he asked what became of the money paid as bonus. The very essence of the co-partnership system was that the bonus to the workers should not be carried away, but should be invested in the stock of the Company.

The motion was cordially agreed to.

The CHAIRMAN, in acknowledging the motion on behalf of himself and his colleagues, said the Company paid their men wages above the market price of their labour; and their system of profit-sharing provided for the whole of the bonus being invested in the stock of the Company. This was only the first six months of the scheme; but on the occasion of their next meeting, he hoped to be able to report the amount of the first holding of stock by the employees.

BRENTFORD GAS COMPANY.

Sound Progress—The Question of a Railway.

The Half-Yearly General Meeting of the Company was held last Friday, at St. Ermin's Hotel, Caxton Street, S.W.—Mr. ULICK J. BURKE in the chair.

The SECRETARY (Mr. William Mann) read the notice calling the meeting; and the Directors' report and statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said the work of the Company had, he need scarcely say, been carried out with the most careful attention during the half year; and he ventured to think that the results would be quite satisfactory to the proprietors. The most noteworthy point that would engage notice was the fact that the dividends recommended had not only been fully earned, with a good balance in hand, but they had been earned in spite of the reduction of 2d., which had been in operation during the December quarter. This was a gratifying point. They had a sum of £102,693 available for dividends. All the items combining to produce this satisfactory state of their enterprise had been favourable. The sale of gas, as compared with the amount sold during the corresponding period of 1909, had increased by no less than 7·42 per cent. Residual products had realized nearly £6000 more. The consumers numbered 91,362 in December last, as against 84,954 in December, 1909. Last, but, in his opinion, by no means least, no less than 7733 additional cooking and heating stoves had been fixed. This was the state of their business at Dec. 31 last. The Board had had to spend money; but it had been well and carefully spent. As to the future, he was bound to say it looked exceedingly hopeful. In order to assure themselves as near as they could, they had made, on the whole, very satisfactory contracts for coal, which, as the proprietors knew, was practically their life blood; and these contracts would carry them on to July, 1912. They knew this was an enormous point to a gas company, because it enabled them to know where they stood in making their financial arrangements. If the coal market was uncertain, the labour market uncertain, and so on, it was necessary to be constantly watching fluctuations; and they hardly knew where they stood. Therefore, he ventured to think that what had been done was a satisfactory thing. On this occasion, he had no important constructional works to which to call attention; and the increasing demand which was seen in the report had to be met, and needless to say must be met, by keeping the works up to their full power. Therefore, there would undoubtedly have to be money spent, and this at no distant time. In consequence of this, it did not pay any gas company to be parsimonious in this matter. They must spend freely; they must keep up with modern invention. This brought him to an important point. They had a cloud hanging over them. It had come in the shape of another proposal to reintroduce the Greater London Railway Bill. It would be remembered that they heard of this first in 1906. It was then proposed to carry out the scheme; but it was fought, he believed, some eighteen days before a Parliamentary Committee. The Company opposed; but they were not called upon to give their evidence, as the Bill was eventually thrown out. But though the Company were not called, they had to expend £2000 in opposing it; and this was a serious matter. The position was this: The Company were very cramped for room at Brentford; and they had been dependent upon the Southall station for the extension of such works as was necessary. As he had previously said, as the demand for gas increased, extension of works would, in course of time, be absolutely necessary. Now this railway proposed to go right through their land at Southall. He might remind the proprietors that this was not simply a case of a railway company going into a part of the country, and saying to the landowners "we will compensate you for the land we require, or give you another piece for it." Over the land in which they were concerned, there were gas manufacturing powers; and the Railway Company wanted to cut right through it. Before manufacturing powers could be obtained over any new land, it would be necessary to go to Parliament. The parliamentary notice could not possibly be given until the end of this year; and it would be a long time before they would get new land on which they could manufacture. They would therefore have to oppose the Bill; and what would happen he did not know. It was really a very serious matter to the Company. They could not afford to have the land taken from them. He did not think he need say anything more about their property; but he should like to say a few words in regard to the causes for the very satisfactory state not only of their Company, but of the gas industry generally. He did not know whether all the proprietors were old enough to remember the great electric scare of 1881, when people were rushing into the market selling their gas stock. It was an old story. Those were the days when the flame of the fish-tail burner was flickering in the streets. It was the time when gas companies were afraid to do anything on gas consumers' premises beyond the meter. They would not do anything in the way of stoves. It was regarded as foolhardy. What happened was this: Science awoke, and invention was stimulated; and the result of it all was that, he thought they might say, nowadays they had found that gas and electricity could co-exist. They began to find in those days of which he had been speaking that it was not enough for gas companies to make gas; but they had to show the consumer how to use it. The incandescent burner came with all its numerous advantages, and gas cookers and fires were introduced. Show-rooms were also started; and everything was done to cultivate new business. How did all this bear upon their Company? Instead of gas being extinguished, he found that since 1907 (which was the time that their excellent friend, Mr. Alex. Johnson, took charge of the Company's affairs), there had been an increase of 23½ per cent. in the consumption of gas. This was very nearly one-quarter; and only in the one year just ended they had, as he had said, fixed 7733 extra cooking and heating stoves. Heating was now an important part of the Company's business; and he hoped it would grow. In his opinion, heating by gas was in its infancy. To encourage heating by gas, it must be an axiom with them that the price should be kept down as low as possible. He heartily congratulated the proprietors upon the state of their finances, and upon the Company's position.

Mr. R. J. N. NEVILLE, M.P., in seconding the motion, referred to the Greater London Railway Bill. He said that it first came before the House of Commons two or three years ago; and it was really a very serious Bill indeed. The Company's case had never been given upon the measure; and he thought it would be found that when their case was given, it would very largely assist in the process of throwing the Bill out. Most of the railway companies were opposing the Bill; so that the new venture would have to run the gauntlet of a considerable amount of opposition. The policy of the Board had been to see that any alteration they effected in their plant made for an increase in efficiency; and since their present Engineer was appointed, every item of expenditure which had been made upon the works had not only increased their efficiency, but it had contributed to a reduction of the cost of production. And it was through these works upon which they had concentrated their efforts in increasing efficiency that the new Railway Company proposed to carry their lines. So far as he knew, the position of their Company was as good as that of any gas company. He hoped that they would be able to decrease the price of gas again, because it was only in this way the proprietors obtained any real benefit out of the magnificent working of the Company.

Mr. A. B. BOSHER congratulated the Board and the officials upon the splendid results they had been instrumental in producing. The figures in the accounts showed how well their affairs were administered. He was a shareholder in a considerable number of gas companies; and, as far as the future was concerned, his feeling as an investor was as optimistic as ever; and therefore he was glad to hear the optimistic expressions in the Chairman's speech. The Chairman had referred to one little cloud over the Company's affairs. But if there was one little cloud at all over the affairs of the gas industry generally, it was that, at any rate for the next few years, the price of coal would be much higher. The Chairman had referred to the wisdom exercised by the Board in making purchases of coal; and he (Mr. Bosher) thought it showed extreme wisdom on the part of the Board to have entered into contracts up to June, 1912. He was a Director of a Company for which he had to buy a large quantity of coal. This took him to Newcastle-on-Tyne; and he was only recently on 'Change there talking to some of his colliery friends about prospects. Although they did not all agree, he found the majority of the colliery men he came across seemed to hold the view that a wave of activity in trade was now setting in. The country was not on the crest of the wave yet. But when prosperity did get on to the real crest, he thought it would be found that steam coal would have a very considerable rise; and it would, as it generally did, take gas coal up with it. No doubt, however, the Board were as *au courant* as he was with these matters.

Mr. FINNIS spoke of the automatic lighting in Chiswick, and mentioned two or three instances where lamps were left alight through the day—occasioning waste of gas. He noticed a decrease of £594 in the receipts for public lighting. He took it that this was due to the reduced price.

The CHAIRMAN said it was. With regard to the automatic lighting, he was obliged to the proprietor for his remarks and interest. A note had been taken of the lamps referred to; and the matter would be investigated.

The motion was unanimously carried.

Moved by the CHAIRMAN, and seconded by Mr. NEVILLE, dividends were declared, subject to income-tax, at the rates per annum of 5 per

cent. on the 5 per cent. preference stock, of 12½ per cent. on the consolidated stock, and of 9½ per cent. on the new stock 1881.

Proposed by the CHAIRMAN, and seconded by Mr. NEVILLE, the retiring Directors (Colonel A. H. W. Cowie and Mr. H. H. Batten) were unanimously re-elected.

On the motion of Mr. SAMUEL SPENCER, seconded by Mr. HODGE, the Auditors (Mr. Monier F. Monier-Williams and Mr. Alfred Bevis) were re-appointed.

A vote of thanks to the Chairman and Directors and to the officers and staff generally was passed; and the CHAIRMAN, in making response for all, spoke of how admirably the Company were served from the chief officers down to the humblest stoker.

READING GAS COMPANY.

The Annual General Meeting of this Company was held last Tuesday, at the Offices, Friar Street, Reading—Mr. J. OKEY TAYLOR, J.P., the Chairman, presiding.

The SECRETARY AND ACCOUNTANT (Mr. A. B. Stedman) having read the notice convening the meeting, the report and accounts were presented. In the former, the Directors stated that the revenue had been well maintained, and that the sale of gas during the past year was greater by 10,806,200 cubic feet. Notwithstanding that the last coal contracts were entered into at higher prices, the excellent results obtained in the carbonizing department had minimized the effect of the increased cost. During the year the Company's mains had been extended in order to supply the district of School Green and other portions of the parish of Shinfield. The secretaryship, which became vacant owing to Mr. A. Canning Williams being appointed Treasurer to the Edinburgh and Leith Corporations Gas Commissioners, had been filled by the promotion of Mr. A. B. Stedman, the Assistant-Secretary. The accounts accompanying the report showed that the income for the year was £103,343, and the expenditure £84,536; leaving a balance of £18,807 to go to the profit and loss account. The sum available for distribution was £28,960; and the Directors recommended the payment of dividends for the past six months at the rate of 5 per cent. per annum on the preference shares and ordinary stock—interim dividends at this rate having been declared in September for the first half of the year.

The CHAIRMAN, in moving the adoption of the report, said there was no need for him to deal at any great length with the accounts, as they were so clear and comprehensible that anyone who was interested could ascertain that the dividend had been well earned during the past year. He should like, however, to place before the shareholders a few facts in connection with the year's working.

REVIEW OF THE YEAR'S WORKING.

There had been an increase of 10,806,200 cubic feet in the consumption of gas. They had also obtained better prices for the residuals, and sulphate of ammonia had gone up in value; and it was very gratifying to find that agriculturists in this country were recognizing more and more the great value of this material as a manure. In former years it was almost entirely exported to foreign countries. The rental received from cookers and fires was steadily increasing, which was a very satisfactory feature. The results which had been obtained in the carbonizing department during the past year were extremely satisfactory, and exceeded anything that had been done in former years; and these excellent results had minimized to a great extent the effect of the increased cost of coal. All the plant had been maintained in a thorough state of efficiency; and it was pleasing to find that there had been realized a considerable surplus after payment of dividends and interest on the year's working. Not only as stockholders but as townsmen, they regretted to see the large number of empty houses in the town. In the Company's district there were no less than 1055 empty houses into which slot gas services had been laid, from which, of course, no revenue had been derived in the way of gas consumption. If gas had been used in these houses during the past year, no doubt the Company would have found themselves at the present time considerably extending their plant. They all hoped that time would produce an improvement in this direction. They must not forget that there was another and important factor at work which tended to keep down the consumption of gas; he referred to the inverted incandescent burner, which was now becoming widely known as the best artificial light in existence, and certainly it was the most economical.

PROGRESS IN TEN YEARS.

They had been subjected to great competition during the past ten years; but he did not complain, as he thought it had tended to increase the popularity of gas, because it had led people to inquire more carefully into the merits of the various artificial illuminants. To show that it had not done the Company any harm, he would give a few figures relative to the progress made during the period he had named. In the year 1900 the Company made 397,966,000 cubic feet of gas; whereas last year they made 626,831,000 cubic feet. The number of consumers in 1900 totalled 5046, and now they had 15,140; and they had 106 miles of main laid now, as compared with 63 miles in 1900. The price of gas in Reading had been reduced from 3s. to 2s. 6d. per 1000 cubic feet, and in Caversham from 3s. 6d. to 2s. 10d.; so the Company had specially favoured the people of Caversham by giving them a greater reduction than they made to the consumers in the borough.

BENEFIT OF PUBLIC DISCUSSION.

The Directors considered that the various statements which had appeared during the past few months before the public, both *pro* and *con*, had resulted in benefiting the Company to a very considerable extent, inasmuch as they had found not only the ordinary increase in the number of consumers going on, but many had returned to the use of gas, being satisfied with its all-round advantages. It was with regret they had noticed that their excellent colleague and good townsman Dr. Hurry had, as they feared, been caused much annoyance from the fact that, as he himself said, an unwarranted use had been made of some remarks of his, which were published in the "British Medical Journal," with reference to the effect which an ill-ventilated gas-lit office might have upon the heart. Dr. Hurry had explained that his remarks would apply with equal, if not greater, force to an ill-ventilated office if lit by the electric light; and he (the Chairman) thought the explanation might have been received, and Dr. Hurry's name not kept before the public in the manner that it had been.

THE STANDARD BURNER BILL AND THE PRICE OF GAS.

The Standard Burner Bill had received the Royal Assent; and in connection with this he might mention that one of the strongest opponents of the Bill—viz., the Liverpool Corporation, who were last year predicting the dire results which would follow if this burner were adopted—were now actually applying for powers to use it in their own district gas undertaking. Nothing could point more strongly to the justice of the case for a standard burner. He hoped the day was not far distant when the Directors would be able to make a further reduction in the price of gas; but they must proceed cautiously in this matter, in view of the possible extension of the borough. When the borough was enlarged a few years ago, the Company declared themselves neutral as regarded questions of gas supply; and upon the present occasion of the proposed borough extension a similar course had been pursued.

THE OFFICERS AND THEIR WORK.

During the year the secretaryship became vacant owing to Mr. Canning Williams being appointed Treasurer to the Edinburgh and Leith Corporations Gas Commissioners. While he was with the Company, Mr. Williams performed his duties to the entire satisfaction of the Directors; and they naturally felt some regret when he left to take up a superior appointment, though they were gratified that one of their officers should have obtained such a position through sheer ability. The Assistant-Secretary, Mr. Stedman, was promoted to the post; and he had performed the duties extremely well, and to the Directors' entire satisfaction. Finally, he felt he should be wanting in his duty if he did not congratulate the Engineer (Mr. Douglas H. Helps, Assoc.M.Inst.C.E.) and his Assistant (Mr. Baker) upon the excellent results which had been obtained during the year. It had been a source of much gratification to the Directors to know of the harmonious feeling which prevailed among those they employed; and nothing was more pleasing to the Board, and he was sure to Mr. Helps, than to cause every effort to be made for their comfort and happiness.

THE REPORT ADOPTED.

The DEPUTY-CHAIRMAN (Mr. H. B. Blandy, J.P.), in seconding the motion, endorsed the Chairman's remarks as to the efficiency of the staff.

The motion was carried unanimously; and the retiring Directors were re-elected.

VOTES OF THANKS.

A vote of thanks having been unanimously accorded to the officers and staff,

Mr. HELPS, in reply, said he desired to acknowledge the assistance he had received from the members of his staff and also from the workmen. He thought he might say they were all working together most harmoniously to promote the welfare of the Company; for, apart from all other motives, it was to their interest to do so. The year had been one of steady progress for the gas industry as a whole, while the capital employed per unit of work done was lower than at any time in the history of the industry. The cost of producing gas was also lower. The introduction of the metallic filament electric lamp had not had the effect of extending business in the manner predicted by their friends the electricians; but it had had a considerable effect on the revenue of some electric light undertakings, so that many of them had to put up the price of current. The great Festival of Empire was to be held this year at the Crystal Palace; and the South Suburban Gas Company had obtained the contract for the lighting of the whole of the extensive grounds there, and for one-half of the interior of the Palace, with incandescent gas. The electricity which would be used in the other half of the building would be generated by gas-engines of 2750 H.P. installed by the Gas Company. But, in his opinion, the most gratifying sign of all was that gas was now generally recognized, not only as a lighting, but also as a ventilating agent. The Society of Medical Officers had, quite recently, installed gas in the place of electricity in some of the rooms of their premises in London to improve the ventilation; and Dr. Reginald Dudfield, speaking as the Chairman of the Committee who had been entrusted by the Council with the supervision of the lighting and ventilating arrangements, had recently said:

> No member who had experience of their meeting-room under the old conditions could deny the improvement that had taken place since gas had been substituted for the electric light and the new system of heating and ventilating had been installed.

He would read an extract from the "Electrical Times," dated Feb. 2, with regard to the atmosphere of the Lecture Theatre in the new premises of the Institution of Electrical Engineers. It was as follows:

> Last Thursday evening was rather sultry; there was a large audience, and complaints of the poor ventilation were heard on all sides. Fortunately it is quite an easy defect to remedy; it is not a question of excessive heating so much as of *stagnant air* which is not being passed out of the building quickly enough.

That was the gas suppliers' case. Gas lighting helped to remove the stagnant air. He would also read an extract from a report in the current issue of the "Medical Magazine" on some experiments by Dr. F. S. Toogood, which were conducted in the Lewisham Infirmary last November. It was as follows:

> That, in both large and small apartments which have normal means of ventilation, gas consumed in modern incandescent burners can be used for lighting without detriment to health; *being found, in fact, to assist ventilation by the increased circulation of the air.*

All this evidence went to prove that gas was now recognized as a valuable ventilating agent.

The SECRETARY returned thanks on behalf of his staff, and also for the remarks made with reference to himself. He had now been with the Company some fourteen years; and during this time every member of the staff had always received the greatest consideration from the

Directors. He believed the staff appreciated this, and did their utmost to promote the interests of the Company.

On the motion of Mr. BLAKE P. ALLNATT, a vote of thanks was unanimously accorded to the Chairman and Directors for their able services in the Company's interests.

The CHAIRMAN briefly acknowledged the vote.

EUROPEAN GAS COMPANY, LIMITED.

An Issue of Bonus Shares.

An Extraordinary General Meeting of the Company was held at Salisbury House, E.C., last Tuesday—Mr. R. HESKETH JONES, J.P., the Chairman, presiding—for the purpose of considering certain resolutions with regard to the share capital and Articles of Association.

The notice convening the meeting set forth the resolutions to be submitted then, and at a subsequent meeting, as follows: (1) That the Directors be, and they are hereby, authorized to sell 779 shares of the Company of £10 each fully paid, and 945 shares of the Company £7 10s. paid, now, and for many years past, standing in the names of certain Directors of the Company as Trustees for the Company, upon such terms, whether by tender or otherwise, and at such time or times, as the Directors shall consider expedient. (2) That the capital of the Company be increased to £1,002,180 by the creation of 16,203 new shares of £10 each. (3) That the regulations contained in the printed document submitted to the meeting, and for the purpose of identification subscribed by the Chairman thereof, be, and the same are hereby, adopted as the Articles of the Company, to the exclusion of, and in substitution for, all the existing regulations. Should Resolution No. 3 be passed by the required majority as an extraordinary resolution, it will be submitted for confirmation as a special resolution to a second extraordinary meeting which will be subsequently convened; and should Resolution No. 3 be so passed at such second extraordinary meeting, the following further resolutions will be proposed at such second meeting. (4) That £250,545, part of the reserve fund of the Company standing to the credit of "Depreciation and Redemption Account," and representing accumulated undivided profits, be distributed among the shareholders registered as holding shares or as holders of share warrants to bearer on March 16, 1911, by way of bonus, free of income-tax, in proportion to the amounts paid or credited as paid on such shares at the date of this resolution, such bonus (which in the case of fully-paid shares will amount to £3 6s. 8d. per share, and in the case of shares on which £7 10s. is paid will amount to £2 10s. per share) being, at the option of any shareholders, applicable to the payment of the amounts then due in respect of any new shares or of calls. (5) That there be an issue of 16,203 new shares of £10 each. (6) That the Directors be, and they are hereby, authorized to offer the said shares at par on March 16, 1911, to the shareholders holding shares at the date of this resolution which were fully paid on Feb. 24, 1911, in the proportion of one new share for every three fully paid-up shares, and that the nominal amount of such shares be made payable to the Company upon allotment on or before March 22, 1911. Such 16,203 shares to participate in any dividend declared after Feb. 1, 1911, in respect of profits accrued up to March 31, 1911. (7) That the Directors be requested to carry out the foregoing resolutions and to make all subsidiary arrangements in regard to fractions of shares to which shareholders may be entitled and otherwise for giving effect to these resolutions as they may deem expedient, and to dispose of any shares offered to a shareholder under the last preceding clause and declined or not accepted by him within such time as the Board may appoint to such persons, and upon such terms, as the Board may think fit.

The CHAIRMAN remarked that, in addition to the notice of meeting, the shareholders had received an explanatory letter which was practically a report of the Directors, but which need not be submitted to them as a report for their approval, as the business that day was strictly limited to passing Resolutions Nos. 1, 2, and 3, as set out in the notice. For some time past, it had been apparent that the property of the Company had not been adequately represented by the shares as quoted on the Stock Exchange; and as the shareholders would have read, in the explanatory letter to which he had referred, the Company had upwards of £250,000 in the depreciation and redemption account, from the accumulation of past undivided profits, which the Board now proposed to divide among the shareholders by way of bonus in shares, thus raising the capital of the Company to £1,002,180. In arriving at this proposal, there had been many difficulties to consider. Among these difficulties, there were three categories of shares. There were the £10 shares fully paid and registered in the London Office; there were the £10 bearer shares, which were not registered, and which were chiefly held by their friends in France; and there were the £10 shares on which £7 10s. was paid, with no prospect of the remaining £2 10s. ever being called up for the requirements of the Company's business. Another difficulty faced the Board. They had for many years past been conducting their business under antiquated "Regulations," equivalent to the Articles of Association of a limited liability company. The regulations were adopted some 35 years ago; and under them the then Directors many years since purchased shares in the Company, which the Board desired to dispose of as soon as practicable, to meet the existing law of limited liability companies. To remedy this state of things, resolutions would be submitted to the shareholders that day. He would also have to submit for their approval new Articles of Association, which had been most carefully drafted by the Solicitors of the Company, under the advice of Counsel; and he need hardly assure the proprietors that the Directors—and especially their colleague, the Managing-Director, Mr. W. Williams—had not failed in their duty to watch the various clauses in those articles, which had been studied and occasionally amended during the past three months. The articles had been lying for a week or so at the London Office of the Company, and shareholders had been invited to inspect them; but such was their confidence in the Directors, that not one single person had been to pay them a visit. Before proceeding any further, he might again state that the business of the present meeting was strictly confined to the adoption or rejection of Resolutions Nos. 1, 2, and 3. Full explanations would, however, be given by him or by the Solicitor of any points on which shareholders might require further information. Prior to moving the first resolution (which would be seconded by the Deputy-Chairman), it would be convenient for him to state that the Directors had fixed the minimum price for the shares to be sold at £26 for the £10 paid-up shares, and £19 10s. for the £7 10s. paid shares, free of stamp duty and registration fee. The proprietors would no doubt have noticed in the last paragraph of the explanatory letter to which he had alluded that the Directors foreshadowed the rate of future dividend to be 10 per cent. on the augmented capital (without bonus). That was to say, holders of shares now £7 10s. paid had hitherto received 12 per cent. on £7 10s.—*i.e.*, 18s. per share. These shares would be converted into fully-paid shares on which 10 per cent. —*i.e.*, 20s. per share—would be paid. By the scheme, the whole of the shareholders were dealt with on precisely the same basis of equality. A shareholder (whether his shares were to bearer or registered in London) holding three fully-paid shares, or £30, in the capital of the Company, had of late years been receiving in dividends and bonus £3 12s. a year. He would now have an additional share allotted to him free of cost—that was to say, he would be the owner of four fully-paid shares, or £40 capital, in the Company, on which the Directors proposed to pay a dividend of £1 per share, or £4 per annum on four shares. So the shareholders would see that their dividends were likely to be increased by one-ninth. Take a holder of shares on which £7 10s. per share had been paid. He held (say) four shares, or £30, in the capital of the Company, on which he had been receiving 18s. per share in dividend and bonus, or £3 12s. per annum. His four shares would now be credited as fully paid—that was to say, his £30 capital would be converted into £40 without any expense to him, and he would be getting the 10 per cent. dividend thereon, which was £4 per annum. There were necessarily cases in which a shareholder held fully-paid £10 shares which were not multiples of three. For instance, a person might own ten or eleven shares. He could only have three bonus shares allotted to him, making his new holding thirteen or fourteen shares, as the case might be. No fraction of a share would be registered; but, on application to the Secretary, arrangements could be made for selling or purchasing others at the current market price. He hoped he had made it sufficiently clear that the whole of the shareholders were dealt with on precisely the same basis of equality. In conclusion, he moved Resolution No. 1, set out above.

Mr. H. E. JONES formally seconded the motion.

The CHAIRMAN then proceeded to answer a number of questions by shareholders. He pointed out that the accounts of the Company were to be seen by the proprietors at certain times—that was, a few days before the annual meetings. The total paid-up capital of the Company was now £751,635; and they were not in need of fresh capital. They were going to create the new shares for the purpose of distributing them among the proprietors, instead of handing out cash and leaving the capital as it was. The actually expended capital would not be increased. The Directors' fees were now £1800. The Board did not anticipate making any alteration in their practice of paying dividends free of income-tax.

The first resolution was then put and carried unanimously, as was also Resolution No. 2, on the proposition of the CHAIRMAN, seconded by Mr. H. E. JONES.

The CHAIRMAN, in submitting the third resolution, as an extraordinary resolution, said that inasmuch as no shareholder had been to the office for the purpose of examining the Articles of Association, those now present would probably not wish him to read either the headings or the text of the articles.

Mr. H. E. JONES seconded the motion, which was at once agreed to.

The CHAIRMAN announced that a second extraordinary general meeting would be held on March 14, to confirm Resolution No. 3; and that Resolutions Nos. 4, 5, 6, and 7, as set out above, would then be submitted for approval and confirmation.

Mr. A. F. PHILLIPS said he knew the Chairman had devoted an immense amount of time to the study of this very difficult question. He himself believed that the scheme proposed was one thoroughly in the interests of the shareholders, as well as for the good of the Company; and as the Board, and the Chairman in particular, had given so much attention to formulating it, he had pleasure in proposing a hearty vote of thanks to them.

This was seconded by Mr. W. J. STEPHENS, and cordially passed.

The CHAIRMAN, in acknowledgment, said the matter had not been an easy one, for there were so many complications; but they hoped that they had, with the assistance of the Solicitor and the Managing-Director, really got the scheme in proper order, and that in the course of a few weeks the whole thing would be finally settled.

WELSBACH COMPANY'S RECONSTRUCTION SCHEME.

The Welsbach Incandescent Gaslight Company, Limited, have issued a circular giving particulars of a scheme provisionally arranged between the Company and the Deutsche Gasglühlicht Aktiengesellschaft (Auergesellschaft), of Berlin, for the promotion of a new Company in England to acquire the assets and undertaking of the English Company. The scheme, of which the following are particulars, will be submitted to the shareholders at a special meeting to be held on Thursday.

It is proposed that the existing English Company should sell their assets and undertaking—under section 192 of the Companies (Consolidation) Act, 1908—to a new English company, which will retain the name Welsbach, to be incorporated immediately with a nominal capital of £265,000. The scheme provides for the sale of the assets, goodwill, and trade name of the present Company for £440,000. At the reorganization of the capital of the Company in 1903, the value of the net tangible assets (inclusive of £70,000 for patents, the chief of which have since expired) was not considered to be in excess of £450,000. Since then, dividends amounting to £377,655 have been paid; but the earning

power of the Company, due to the ever-decreasing margin of profit obtainable, has diminished year by year. When, therefore, overtures were made by the German Company, coupled with an offer to provide the sum of £100,000 in cash for the purposes of the scheme, the Board at once agreed to the furtherance of the negotiations. In view of the fact that, owing to the increasing and serious competition, the sales continued to show a decline, both at home and abroad, the Board came to the conclusion that they should, having regard to the views expressed at the last meeting, concentrate their efforts upon obtaining a satisfactory price for the undertaking as a going concern, instead of proceeding with the scheme for reducing the capital of the Company. The assets of the Company (excluding all the patents, valued in 1903 at £70,000) are estimated at £450,000, and may be broadly divided into three heads: (1) Cash and investments, 12½ per cent.; (2) freehold, leaseholds, plant, debtors and stock, 47½ per cent.; (3) Austrian shares, 40 per cent. The great bulk of the assets—over 80 per cent., in fact—are essentially of a special character almost wholly applicable to the trade concerned. This is particularly the case in Austria, where the Austrian Company have not, and have not for several years past had, monopoly rights of any description whatever. As to the suggestion made, to the great detriment of the Company's trading during the past season, of an ordinary liquidation, the Board think it doubtful, having regard to the special character of the assets and to the Company's engagements under leases, licences, contracts for periods of years, and so forth, whether a figure would be realized in a winding-up approximating the German Company's offer. If the offer is accepted, the purchase price of £440,000, payable as to £100,000 in cash, £240,000 in 4½ per cent. debentures, and £100,000 in new shares, will, subject to the passing of the necessary resolutions and to the cost of carrying out the present scheme over and above the contribution thereto by the purchasers not exceeding £7000, and on the assumption, which the Board believe to be the fact, that the preference shareholders own between them some 480,000 of the 743,975 ordinary shares of the Company, be distributable approximately as follows: To the preference shareholders (who, in a winding-up, would otherwise be entitled to the assets at the rate of 30s. for every £1 share), as preference shareholders in cash, at the rate of 3s. 4d. per preference share, as preference shareholders in 4½ per cent. debentures, at the rate of 8s. per preference share, making a total of 11s. 4d. per preference share; to preference shareholders holding ordinary shares, £64,000 in new shares and fractions thereof, or the value of such fractions at the rate at par of (about) 2s. 8d. per ordinary share; and the balance to the remaining ordinary shareholders who do not hold preference shares at the rate at par of about 2s. 8d. per ordinary share in new shares and fractions thereof, or the value of such fractions. The 4½ per cent. debentures of the new Company will be guaranteed by the German Company as to principal and interest, and will be secured by deed of trust upon the English Company's freehold, leaseholds, investments, and patents, and upon the Austrian shares. A sinking fund of £8000 a year (commencing in 1913) will also be provided for; while, if prior general redemption of the debentures (otherwise than by drawings covered by the sinking fund) is desired by the German Company, this is to be at £103 per £100 of stock.

The Board strongly recommend the immediate acceptance of the German Company's offer. The terms of the provisional agreement have been communicated to the members of the Shareholders' Committee appointed at the last general meeting; and the Board report that the members of the Committee have intimated that, in the circumstances, they will, in respect of their own holdings, aggregating 24,291 preference shares and 25,725 ordinary shares, vote in favour of the acceptance of the offer.

SULPHUR COMPOUNDS IN COVENTRY GAS.

Report by Dr. Harold G. Colman.

The Gas Committee of the Coventry Corporation have received and considered a report from Dr. Harold G. Colman in regard to sulphur compounds in their gas and the methods of eliminating them. Dr. Colman states that, in his opinion, there is no certain method of removing the sulphur from the gas without reverting to lime purification. Up to about three years ago, the quantity of this impurity in the Coventry gas had for many years been kept well below 20 grains per 100 cubic feet by means of lime purification; but, owing to the numerous objections to the process, it was abandoned, not only in the Coventry Gas-Works, but also in almost all others where it had been previously practised. This abandonment was largely a result of the report of the Board of Trade Committee, under the chairmanship of Lord Rayleigh, issued in 1904, in which it was recommended that the statutory compulsion for the reduction of the sulphur to a low limit should be rescinded in the case of the Metropolitan Gas Companies. It was anticipated that, as a result of the omission of lime purification, the amount of sulphur would rise to about 30 to 35 grains. This was the quantity usually present in gas thirty to forty years ago, before lime purification was largely practised; and this amount, under present conditions of gas supply, would not be materially worse than the lower amount of 20 grains or less obtainable with lime purification. The experience of the last few years has shown, however, that on a number of works (among which those at Coventry are included) the amount of sulphur left in the gas has risen to a figure much higher than was anticipated; and instead of an average of about 35 grains and a maximum of 40 grains, the average is in some cases double this amount—viz., 70 grains—and the maximum over 100 grains. When this is the case, the presence of so large a quantity is open to great objection; and the complaints which have arisen, as is the case at Coventry, are, in Dr. Colman's opinion, to a large extent justifiable. He considers it most advisable that the amount should be reduced, at any rate to an average of not more than 35 grains. Proceeding to discuss the methods available for the further reduction of sulphur in the gas, Dr. Colman makes the following remarks.

The much higher amount of sulphur left in the gas when lime purification is not employed, as compared with the amount under similar conditions thirty to forty years ago, is due partly to differences in the quality of coal carbonized, and partly to altered conditions of retort-house working, especially to the higher temperatures now employed. For the reduction of the sulphur, two methods are therefore available.—viz., (1) altering the quantity of coals carbonized or the conditions of carbonization, or both, so as to prevent or minimize the production of sulphur compounds; and (2) the reintroduction of a process for the removal of the sulphur compounds—the former being a method of prevention, and the second of cure. If it could be economically carried out, the first plan would undoubtedly be the better; and I thought it essential to study first how far this would be possible. The most obvious plan, which has often been suggested, is to purchase only such coals as are found to give low quantities of sulphur in the gas when purified by oxide of iron only. Except in the case of very small works, however, this plan is commercially impracticable, as the inevitable result of restricting the sources of coal which can be used is eventually to create a special demand for those coals, and to raise their price, with the result that the manufacturing costs would be increased to a much greater extent than they would be by the introduction of a special process for removing the sulphur compounds. The same is true of the plan of reducing the temperatures of the retorts, for the higher temperatures now employed have resulted in very great economies in manufacturing cost, which would all be lost by returning to the temperatures formerly employed; and this loss would far exceed that of a purification process.

There are, on the other hand, two conditions in retort-house practice which do considerably affect the quantity of sulphur compounds produced—viz., the weight of the charge put into the retort, and the pressure maintained in the retort during carbonization; and during the past four months experiments have been made at Coventry to ascertain as far as possible to what extent a reduction of the amount of sulphur could be brought about in this manner. The result of these experiments, together with experience in other works, has led to the conclusion that, with the coals which it is otherwise most remunerative to employ at Coventry, there is by this plan but little likelihood of reducing the sulphur on the average to less than two-thirds of its present amount—viz., about 45 grains per 100 cubic feet, which would not be low enough to avoid complaint, even though it would be better than the present condition of things. And to get even this reduction would involve a considerable capital outlay.

Under the present conditions, therefore, it is not, in my opinion, probable that a sufficient reduction of the sulphur could be obtained by altering the conditions of carbonization, and that it will be necessary to adopt some further purification process for the removal of the sulphur compounds. At the present time, the lime purification process is the only one which is available; for, though this process is open to many objections, it is the only one which has yet proved itself successful for the purpose at a large number of gas-works. An old process formerly tried unsuccessfully—viz., the re-heating of the gas after purification with oxide of iron, and then again passing through oxide purifiers—is stated to be now successfully at work in the United States. But the information available is not yet sufficient to show that it would be successful under other conditions; and the costs given indicate that these would not be less than those of lime purification. I am also at present working at another process, which, if successful, would be simpler and cheaper than lime purification. But this process is not yet sufficiently advanced to enable me to judge even of the probability of its success; and I could not recommend its trial on a large scale at present.

Under these circumstances, I am, with considerable regret, compelled to come to the conclusion that the only plan I can recommend for adoption at the present time is that the Coventry Gas Department should revert to lime purification. This will, with proper working, enable the amount of sulphur in the purified gas to be kept low generally, and should remove any cause of complaint which at present exists in this respect. On the other hand, the objections to the process must be borne in mind—viz., that its reintroduction will necessitate a considerable capital outlay, and will increase the manufacturing costs by about ½d. per 1000 cubic feet. In place of the complaints with regard to sulphur from consumers, some complaint will also probably arise from the district around the gas-works with regard to the smell of the spent lime; and the emptying of the lime purifiers is a much more unpleasant task for the men than that of changing an oxide purifier. As far as the more distant future is concerned, the indications are that, as the vertical retort system extends, the quantity of sulphur found in the crude gas will be very greatly reduced, and that it will be possible to reintroduce oxide purification with gas made in such retorts, and yet keep the amount of sulphur below 35 grains per 100 cubic feet.

The Gas Committee state that the Engineer and General Manager (Mr. Fletcher W. Stevenson) reported that he agreed with Dr. Colman's conclusions. He estimates the cost of the new purifiers, connections, &c., required at a sum not exceeding £14,000, and that the extra cost of purifying with lime as compared with oxide will be about ½d. per 1000 cubic feet of gas sold—that is, about £1750 per annum. The Committee have resolved to recommend that lime purification be reverted to, as suggested in Dr. Colman's report, and that the necessary purifiers, connections, &c., should be provided for the purpose, at the estimated cost of £14,000.

Charge for Water for Building Contracts.—The Torquay Town Council have had under consideration the question of the charge made for the use of water by builders. The practice of the Corporation has been to charge 8s. per £100 of the contract, irrespective of the quantity of water taken. It was contended that this charge was unjust, and that it included carpentry and other work in which no water was used. The question arose in particular upon the recently executed contract for the erection of new municipal buildings, where the charge for water upon the basis above referred to will amount to £128, whereas the contractor, relying upon his experience in other towns, had estimated the charge at only £25. The Council decided that, in justice to other persons who tendered, no difference could be made in the charge in this case; but it is understood that the matter will be considered by a Committee.

GAS SUPPLY IN NORTH LONDON SUBURBS.

In the report presented by the Directors of the Southgate and District Gas Company at the half-yearly meeting last Thursday, they stated that, as compared with the results for the second half of the year 1909, the sale of gas in the six months ended Dec. 31 last had increased by 9,578,500 cubic feet, or 11·99 per cent., and the receipts from residual products by £955. The revenue for the half year amounted to £20,024, and the expenditure to £15,453; leaving a balance of £4571 to go to the profit and loss account. The amount available for distribution was £7181; and the Directors recommended the declaration of dividends for the half year at the maximum rates—viz., 5 per cent. on the preference capital, and 10 and 7 per cent. respectively on the original and additional capital. These payments would absorb £2962, and leave £4219 to be carried forward.

At their half-yearly meeting yesterday, the Directors of the North Middlesex Gas Company reported that there had been an increase of 9,797,000 cubic feet, or 9·9 per cent., in the quantity of gas sold in the six months ended Dec. 31 last in comparison with the second half of 1909, and that the returns from residual products were also larger. The total revenue was £23,419, and the expenditure £17,484; leaving £5935 to go to the profit and loss account. The amount available for distribution was £8333; and the Directors recommended the declaration of dividends at the rates of £5, £10 10s., and £7 7s. per cent. per annum on the preference, original, and additional capital respectively, and the placing of £473 10 to the reserve fund. This would absorb £4004, and leave £4329 to be carried forward.

BARNSTAPLE GAS AND WATER SUPPLY.

The question of the extension of the area of supply was referred to at the recent annual meeting of the Barnstaple Gas Company. Mr. C. E. Roberts Chanter, the Chairman, stated that, in consequence of the extension of the mains of the Barnstaple Water Company towards Instow, applications had been made to the Company for a supply of gas. The Directors believed that an extension to Bickington and Fremington, and probably to Instow, in the near future would be in the interest of the Company. They had power to supply Fremington; and it was proposed by their Provisional Order to obtain powers to extend their limits so as to include Instow. The Company should obtain these powers, in order that they might be able to develop in this direction. In all probability, Instow would grow largely when it had a good water supply, as it was already much frequented in summer. In reply to a question, Mr. Chanter said the estimated cost of laying a main to Bickington was £1000. This was what they were practically committed to at present; and they had the promise of several large consumers. No estimate of the cost of extension to Instow had yet been obtained. As to the electric light, he did not think the Barnstaple Corporation would be allowed to supply the district outside their own borough; so that the fear of competition was not great. Sanction was unanimously given by the shareholders to the application for the Provisional Order. With regard to the past year's working, the Directors stated that it had been very satisfactory, and that after payment of the interim dividend there was a balance of £4459 of net revenue. The Chairman said the revenue from the sale of gas was £7129, against £7122 last year; and the total revenue for the year was £9969, compared with £10,084 in 1909. The expenditure was £8155; leaving a balance of £1814 to be carried to the net revenue account. There was an increasing demand for cookers and for heating-stoves. The works were in a thoroughly satisfactory condition; and a Government Inspector who recently visited them had congratulated the Manager (Mr. F. L. Schofield) upon the many improvements which had been made.

Presiding at the half-yearly meeting of the Barnstaple Water Company, Mr. Chanter referred to the extension of the mains under the Provisional Order recently obtained by the Company, and said the work was proceeding in a satisfactory manner. It was hoped that Instow would be reached by the end of the present month or the beginning of March, and that they would be able to supply the town early in July. An improvement had been made in the manner of carrying the water over the bridge at Barnstaple. It had hitherto been found impossible to keep in good repair the pipes laid over the bridge, owing to the vibration; and a change had been made by carrying the water across in 4-inch steel tubes. The revenue account showed a balance of £2261; and the Directors recommended payment of the usual dividends of 10s. per share on the "A" shares and 7s. per share on the "B" shares; leaving £1400 to be carried forward. On capital account there was an increased expenditure owing to the extension of the mains and the cost of obtaining the Provisional Order. Barnstaple, said Mr. Chanter, need not fear being short of water owing to the supply of the neighbouring districts, for they could serve 50,000 persons and still have a surplus. The dividends recommended were declared.

Tynemouth Gas Company.—The report which was adopted at the forty-fifth ordinary general meeting of the Company stated that there was a balance of £11,083 profit on the working for the year to Dec. 31; and with a sum of £7371 brought forward, the amount at disposal was £18,454. Dividends of 5 per cent. per annum on the ordinary stock and 4 per cent. on the preference stock, less income-tax, would leave a balance of £7270 to carry forward. The make of gas showed an increase of 1,055,500 cubic feet over that of the previous year; and the selling price still stood at 2s. per 1000 cubic feet in the borough and Whitley and Monkseaton districts. The serious strike in the shipyards and general depression in trade during the past year were accountable for the smallness of the increase in the make. The revenue from the sale of gas was £49,893, against £49,805; and from residuals, £21,217, against £20,039. Residuals had realized exceedingly well, showing an increase of £1177; and the prospects for this year were satisfactory. The number of ordinary and prepayment meters in use at Dec. 31 was 20,377; being an increase of 763 over the previous year. The Engineer (Mr. W. Hardie) reported that the works and plant were efficient and maintained in excellent order.

EFFICIENCY OF GAS-FIRES.

In the "JOURNAL" last week (p. 545), we gave two letters which had appeared in the Engineering Supplement to "The Times," on the subject of "Electric *v.* Gas Heating." Another correspondent, whose letter was not reproduced, was Mr. Henry Lea. Some points in his letter, as also in that of "Volta," have been dealt with by Mr. H. James Yates, of Birmingham, whose paper on "Coal Gas as a Fuel," recently read before the Liverpool Engineering Society, was given in the "JOURNAL" for the 14th inst. (p. 437); and, in view of Mr. Yates's position in the gas industry, we reproduce his letter, which appeared last Wednesday.

"Volta" states that he has found the modern gas-fire with flue gives 50 per cent. heating efficiency. As a matter of fact, this falls very far short of the actual efficiency of modern gas-fires, because there are stoves of this description in very wide use to-day which give as much as 55 per cent. efficiency in radiation alone. As 20 to 25 per cent. of the remaining heat units are employed to give a temperature in the flue sufficient to carry off the products of combustion and at the same time adequately ventilate the apartment, and as the remaining heat units—20 to 25 per cent.—are utilized in the form of convected heat, the actual heating efficiency is from 75 to 80 per cent. These figures are based upon prolonged tests made with the most complete modern laboratory apparatus available.

Mr. Henry Lea's references to gas-stoves, though obviously not made in any unfriendly spirit towards gas-heating apparatus, are evidently based upon experience with obsolete types of stove. He says: "An electric radiator or flueless gas-stove warms the same air of the room over and over again, and promotes no ventilation whatever." In so far as this statement refers to flueless gas-stoves, it is entirely at variance with experience. This is proved by the results of tests carried out by my laboratory staff in a very large number of cases with samples of air taken all over the country and in all sorts of apartments where flueless gas-heated steam-radiators are in use. These tests have uniformly shown that these flueless gas-stoves add only 5 parts of carbonic acid, in properly-ventilated apartments, to each 10,000 parts of the atmosphere of the apartment—a figure which, added to the 3 to 5 parts per 10,000 normally found in the atmosphere, still leaves the total well under the 12 parts per 10,000 which is regarded as a safe maximum by the Departmental Committee on Ventilation in Factories. Indeed, in some cases it is found that the effect of these flueless gas-stoves in stimulating ventilation is such that the proportion of carbonic acid in the atmosphere at the close of a day's full use of the radiators has proved to be actually less than on the previous day without them.

In view of these figures, if Mr. Lea were correct in stating that these stoves warm the same air in the room over and over again, then, as each 1000 cubic feet of space heated in this manner requires about 4·5 cubic feet of coal gas per hour for heating it, we should find that at the end of eight hours, 36 cubic feet of gas having been burnt, 20·4 cubic feet of carbonic acid would have been liberated, and this would amount to an increase of 204 parts per 10,000!

While flueless gas-stoves should never be used in living-rooms or small and ill-ventilated apartments, yet the foregoing verified results, as well as the experience of their widespread use over a number of years, clearly warrant their being employed in well-ventilated large apartments; and a most recent proof of this is to be found in the report appearing in the February issue of the "Medical Magazine" of tests of such apparatus made in the South London Infirmary by the Medical Superintendent, Dr. F. S. Toogood. [See *ante*, p. 512.]

Mr. Lea also remarks: "The effluvium from flueless gas-stoves poisons the air and renders it unfit to breathe." Nothing could be farther from the actual fact. As is well known, the products of combustion of coal gas in a properly-designed flueless stove are carbonic acid and water vapour; so that not only is the combustion in these stoves innocuous in itself, but it has to be further remembered that all products of combustion, and all air passing over the flame, are completely sterilized. In this connection, reference may also be made to the report mentioned.

In the last paragraph of his letter, Mr. Lea states the cost of heating his office by gas as 3s. 6d. per day. Now, taking the number of heat units which he states are required for the purpose (but which I shall presently show to be altogether excessive), it is found that, with gas of a net calorific value of 550 B.Th.U., it would require a gas-fire burning 77·6 cubic feet to heat his office. This, with gas at 2s. 6d. per 1000 feet and allowing 25 per cent. for loss by the flue, would cost in a nine-hour day not 3s. 6d., as he states, but 1s. 9d. But, as I have already said, there is something seriously amiss in Mr. Lea's figures. As regards the allowance of 3500 B.Th.U. for loss of heat through windows, walls, &c., not being acquainted with the room, I must take this figure, though it is clear to me that it is far from correct. The number of units required to heat the air of the room is stated by Mr. Lea at 24,400. From the dimensions he gives, the contents of the room are 3264 cubic feet. Trebling this figure to give the three changes, we have 9792 cubic feet per hour of air to be heated through 30° Fahr. This quantity of air weighs 750 lbs., and to raise 1 lb. of air 1° Fahr. requires 0·238 B.Th.U. at constant pressure; so that to raise 750 lbs. through 30° Fahr. requires 5355 B.Th.U. Adding to this the above 3500 B.Th.U., we get a total number of 8855 units required to heat the room, instead of the 27,900 units he states! This with gas of 550 B.Th.U. would mean 21·5 cubic feet per hour, which in a nine-hour day would amount to 193·5 cubic feet; and this at 2s. 6d. per 1000 feet works out at 5·8d. per day. This is the result working on Mr. Lea's data. But, from my experience, I should recommend for such a room a gas-fire capable of burning as much as 30 cubic feet of gas per hour until the room is heated up, after which the gas can be reduced so as to give a total consumption for the nine-hour day of 220 cubic feet, or 6·6d. Thus the heating of the room in question by gas would cost only a fraction more than by coal; and when the labour-saving and other conveniences are taken into account, the great advantage of gas heating will be obvious.

PUBLIC LIGHTING AND GAS TESTING IN LIVERPOOL.

Annual Report of the Superintendent.

We have received from Mr. A. G. Smith, the Superintendent of Street Lighting, Gas Examiner, and Official Inspector of Gas and Electric Meters to the Corporation of Liverpool, his report for the past year, from which we extract the following particulars.

Economy of the Controller System.

The work of the department during the year was of a routine character; the only item of special interest being the automatic lighting and extinguishing of street-lamps, as to which Mr. Smith considers the economies which have been and will be effected should be indicated. The following table shows the number of controllers fixed at the end of each year, together with the mileage of streets lighted throughout the city, the total number of lamps, and their aggregate illuminating power:—

Year.	Number of Controllers.	Miles of Roads Lighted.	Number of Lamps.	Illum. Power. Candles.
1908	272	458½	19,085	1,137,676
1909	937	463¾	19,311	1,148,516
1910	2357	468	19,554	1,184,734
1911 (Estimated)	4357	473	19,754	1,194,134

It will be noted that by the end of the present year there will be 4357 controllers fixed, unless something unforeseen arises.

Since the date of the first installation, the length of roads lighted has been increased by 14½ miles, or 3 per cent.; the number of lamps by 669, or 3 per cent.; and the illuminating power by 56,458 candles, or 5 per cent. In the face of these increases, the labour charges have decreased from £18,864 14s. 9d. in 1908 to an estimated £17,976 in 1911—a reduction of £888 14s. 9d. for the current year.

Mr. Smith explains that prior to 1908 there was an average annual increase of £254 in the labour charge, which must be taken into consideration in arriving at the saving. He says it is reasonable to assume that with a growing city, increasing the mileage of streets lighted, and with greater illumination, this rate of increase would have continued had not the controller system been operated. Consequently, by the old calculation, the amount for 1911 would be brought up to £19,626, whereas it is estimated, as already stated, that £17,976 will be sufficient; showing a material annual saving, as 4000 controllers represent approximately one-fifth of the total number required. The effect of the use of controllers has been to reduce the annual maintenance charge of the lamps fitted with them to 10s. per lamp during 1910, against 10s. 7d. in 1909, and 10s. 4d. in 1908. During last year, 1420 controllers were fixed, forming seven new districts; making a total of twelve districts formed to date [shown on a plan accompanying the report]. Mr. Smith states that by care this result has been attained without the dismissal of any men. In addition to the purchase of the controllers, it has been necessary to convert the old lamps to those of the new type of storm-proof lamp. Both of these items have been paid out of the levy for lighting purposes.

The Public Lighting.

The city is lighted by 19,113 lamps—12,686 of them being in the old city and 6427 in the suburbs. The following table shows the number of lamps used in the lighting of streets, courts, and passages.

District.	Length of Roads Lighted. Miles.	Streets.		Courts.	Passages.	
		Flat Flame.	Incandescent.	Flat Flame.	Flat Flame.	Incandescent.
Old City	268	229	9,220	707	2,342	34
Suburbs	193¼	33	5,270	..	1,098	1
Total	461¼	262	14,490	707	3,440	35

There are also 173 flat-flame and 4 incandescent burners in use in lavatories in the city. Compared with 1909, there is a net increase of 127 lamps; and the total maintenance amounted to £48,289 3s. 10d., compared with £47,818 17s. 7d. in 1909. The total length of roads lighted at the end of the year, irrespective of courts and passages, amounted to 468 miles; 6¾ miles being by electricity, 452¼ miles by incandescent gas, and the remaining 9 miles (principally back streets) by the ordinary flat-flame system.

In connection with the lighting of new streets, passages, &c., the following work has been carried out: 87 single incandescent gas-lamps were erected in 3¼ miles of streets, and 38 flat-flame burner lamps and a single incandescent lamp in 39 passages, at the expense of the owners; the streets and passages not having been adopted by the Corporation. The revenue derived from this source during the year amounted to £355 11s. The lighting of 5¼ miles of road was extended or re-arranged during the year in adopted streets, involving the erection of 5 double and 54 single incandescent gas-lamps, and the removal of 64 existing lamps to new positions; while 97 lamps were removed to new positions owing to the widening of roadways and sidewalks, alterations to property, and other causes. Seven single incandescent gas-lamps were fixed in lieu of flat-flame burners, seven columns in lieu of brackets, and 20 columns in lieu of broken ones. Three 2-feet flat-flame burner lamps and one single incandescent lamp were fixed in adopted passages last year. The dispute with the Liverpool Gas Company, as to who was responsible for the cost of laying the service-pipe to new lamps in passages, was settled during the year by the Corporation agreeing to pay 50 per cent. of the Company's charges since the commencement of the work in 1896. The amount of the Corporation's liability to the Company is £3212 6s.; and [as already announced in the "Journal"] the Company have agreed to accept it in three annual instalments.

The entire maintenance of columns, brackets, lamps, and fittings is undertaken by the department; and the following among other work was carried out last year by a staff of 65 mechanics, &c. (the figures for 1909 being given for the sake of comparison).

	1909.		1910.
On district—			
Columns reinstated	247	..	226
Lamps repaired	12,216	..	13,102
,, reglazed	30,236	..	30,653
,, changed	1,600	..	2,201
Visits paid by trimmers to incandescent gas-lamps	159,141	..	145,204
In stores—			
Incandescent gas-burners cleaned, repaired, and adjusted, &c.	4,299	..	5,125
New incandescent gas-burners adjusted	973	..	2,266
Incan. gas-burner chimneys cleaned	164,436	..	165,475
Regulators adjusted, &c.	7,370	..	8,205
New regulators adjusted only	2,170	..	2,554

During the year, there were 305 accidents to street-lamps caused by collision with vehicles. In 128 cases the police were able to ascertain the names and addresses of the owners of the vehicles, and accounts for repairs to the value of £84 4s. 5d. were rendered.

Quality of the Gas.

The number of tests made of the illuminating power of the gas was 418—viz., 315 in the office, and 103 in the district; and on 95 occasions it was found to be below the standard. The maximum and minimum results obtained were 22·94 and 17·44 candles respectively. Periodical tests were made at the works of the Corporation at Fazakerley; the results of 159 tests showing the illuminating power of the gas to be 20·01 candles. Mr. Smith mentions that the question of the adoption of the No. 2 "Metropolitan" argand burner by the Gas Company for use in Liverpool was under the consideration of Parliament during the year, and a settlement was ultimately arrived at; the Company agreeing, upon the withdrawal of opposition by the Corporation, to reduce the price of gas as from the 31st of March next by 2d. per 1000 cubic feet, subject to coal prices—the illuminating power of the gas to equal at least 20 candles in the new burner, and not to fall below 18 candles when tested by the old standard burner. During the year, 480 tests were made for calorific power; showing an average of 619·85 B.Th.U. per cubic foot of gas net, against 640·77 B.Th.U. net in 1909, which Mr. Smith thinks may be considered satisfactory. There were 456 samples of gas taken in various parts of the city, and tested for the presence of carbon monoxide. The average of the tests indicated 9·8 per cent., representing an admixture of 14 per cent. of carburetted water gas, which is in conformity with the Departmental Committee's recommendation on the subject. But as much as 17·8 per cent. of carbon monoxide, representing an admixture of 48 per cent. of carburetted water gas, was found at Garston; the average of the tests in this portion of the city being 15 per cent., representing an admixture of 36·1 per cent. of carburetted water gas. The results of all these tests have been forwarded to the Medical Officer of Health. The average results of 449 tests for purity, involving 703 visits to the various works, are tabulated. The sulphur compounds were well within the statutory limitation.

Gas-Meter Testing.

With regard to the testing of gas-meters, the Superintendent reports that the total number last year was 10,817, compared with 11,829 in 1909; the fees received amounting to £388, compared with £434 before. The following are the details of the year's work:—

	Company's.		Sundry.		Prepayment.
Meters certified	4827	..	521	..	4903
,, rejected	45	..	300	..	221
	4872	..	821	..	5124

Testing of Consumers' Pipes and Fittings.

Mr. Smith expresses regret that there was a great falling-off in this work last year; only 73 tests having been made. These, however, were sufficient to demonstrate the usefulness of the work, for only 5½ per cent. of the pipes and fittings tested could be certified as sound. In 39 of the tests, the gas was escaping at the rate of from 0·1 to 0·9 cubic foot per hour; in 22, from 1 to 4 feet; in 4, from 5 to 9 feet; in 4 other cases, at 10, 17, 24, and 50 feet; and 4 were sound.

Naphthalene Deposits.

During the past year, the department dealt with 694 reports of failures in the gas supply to public lamps due to the presence of naphthalene. The Superintendent says this is a large reduction in the number of stoppages; and he attributes it to the new system of automatic lighting—"there not being a single instance of a stoppage in the new lamps."

Expenditure of the Department.

The total charges in connection with the public lighting of the city and the supervision of the gas supply for the year amounted to £55,277, and a revenue of £2741 was derived from the work charged to other departments and bodies; making a net expenditure of £52,536.

Extensions at the Blaina Gas-Works.—The Brynmawr and Blaina Gas Company have just completed the remodelling and reconstruction of plant; bringing up the capacity of the works to 100 million cubic feet per annum. The new work includes steel foul main, annular condensers, Livesey washer, washer-scrubber, and purifiers with Pickering's patent valves, gasholder and steel tank, and a complete rearrangement of the yard mains. The whole of the work has been carried out by Messrs. Willey and Co., Limited, of Exeter, to the designs and specifications of Mr. Evan Rees, the Gas Company's Engineer and Manager, who has also personally supervised the erection of the work on the site. The Gas Company are to be complimented on having now thoroughly modern and up-to-date plant equal to any demands which may be made upon them for many years to come.

PUBLIC LIGHTING OF HOLBORN.

A Report Submitted but not Received.

At the Meeting of the Holborn Borough Council last Wednesday, the question of the improved lighting of the streets of the borough, with special reference to high-power lamps in the more important thoroughfares which at the preceding meeting was adjourned and referred back to the Works Committee for further information as to lamp-standards for high-power lamps, &c. [see *ante*, p. 468], was again brought up first on the following proposition of the General Purposes Committee:

> In view of the fact that the contract with the Gaslight and Coke Company for street lighting will expire on the 31st of March next, it is necessary to make arrangements for lighting the public lamps after that date, pending a decision being arrived at on the question of improved lighting. We have therefore requested the Town Clerk to ascertain whether the Company would be willing to continue the contract for lighting the lamps as at present, on the understanding that the arrangement shall be determinable by one month's notice on either side. We have appointed a Sub-Committee to draw up and submit for the approval of the Council a scheme of lighting for the borough, and we propose afterwards to consider further as to the best means of carrying out the scheme which may be adopted. We recommend: "That the proposed continuance of the present contract with the Gaslight and Coke Company for street lighting, till determined by a month's notice, be approved."

The proposition having been unanimously agreed to, the Sub-Committee reported as follows:

Public Lighting.

In accordance with the terms of our reference, we have met to-day (Feb. 16) and settled a scheme of improved lighting for all the streets in the borough, according to a schedule which is appended hereto.

We are of opinion that it is advisable that fresh tenders should be invited upon the basis of the actual requirements of the Council, and according to specification, which should be settled by the Works and General Purposes Committee. The previous tenders were made according to a scale of prices for individual units of lighting; and although this is necessary for the purpose of any subsequent alterations that may be made, we think it is essential that tenders should be also obtained quoting an inclusive price per annum for carrying out the scheme, so as to avoid the misunderstanding caused by calculations being based upon hypothetical figures.

At present all the streets in the borough, except Kingsway and places where trial lamps have been erected, are lighted by upright incandescent gas-mantles, giving, on the average, about 60-candle power each; additional light being obtained at important points by grouping several of such units. The total candle power of all lamps in the borough is about 140,000. We propose that the minimum candle power should be increased to 90, which, in view of the closeness of the lamp-posts, would give, in our opinion, sufficient lighting except in wide or busy thoroughfares. For lamps of 90 to 180 candle power, the existing standards would require no alteration; and for higher powers the standards could be easily adapted by extension pieces being fixed to them. The only case where new standards would be required is High Holborn and New Oxford Street; and here we propose that 48 new standards should take the place of the 101 old ones.

The present high-pressure lamps in Kingsway give 900-candle power each; and it is proposed to increase this to 1800, which we think is desirable on account of the width of the road, and in order to correspond with lamps of that power erected in the Westminster portion of the thoroughfare.

The following schedule [see below] has been arranged after a careful consideration of the traffic conditions existing in each of the classes of streets.

We recommend: "That the schedule of lighting be approved, and that the Works and General Purposes Committee be authorized to obtain and submit tenders for carrying out the scheme, either by gas or electricity, on a specification approved by them for a contract for five years, to be extended to ten years at the Council's option."

The following is an epitome of the lighting schedule:—

Candle Power of Lamps.	Location.	No. of Columns.	Total Candle Power.
1500 ..	High Holborn and New Oxford Street . . .	.. 48	.. 72,000
1800 ..	Kingsway, High Holborn Crossing, and Southampton Row . .	.. 28	.. 50,400
600 ..	Tottenham Court Road	.. 20	.. 12,000
400 ..	Seventeen thoroughfares named	.. 309	.. 123,600
300 ..	British Museum Avenue, Rosebery Avenue, and five refuges . .	.. 48	.. 14,400
180 ..	Various places specified	.. 37	.. 6,660
90 ..	Remaining streets . .	.. 1390	.. 125,100
	Total	1880	.. 404,160

Alderman MAX CLARKE (the Chairman of the Sub-Committee), in moving the adoption of the report, said the Sub-Committee had been specially authorized by the Grand Committee to report to the Council with a view to expedite matters, so that fresh tenders could be obtained from the competing companies. It would be remembered that when the question was referred back, they were ordered to bring up a report in a month's time. What they wanted the Council now to do was to say how much light was required, and then they would obtain estimates and bring them up in a fortnight's time. If the Council did not desire to deal with the matter, he would be pleased to take it back; but the principal idea in the Sub-Committee bringing it forward was in order to save time.

It was pointed out that it was contrary to one of the Standing Orders for the Council to receive a report from a Sub-Committee; and also that another required all transactions of Sub-Committees to be submitted to the Committee giving them instructions. As several members of the Works and General Purposes Committee complained that they knew nothing of the recommendations of the Sub-Committee, the report was not received.

PUBLIC LIGHTING OF PADDINGTON.

Loan Sanctioned by the London County Council.

At the Meeting of the London County Council last Tuesday, the Finance Committee reported that they had considered an application from the Paddington Borough Council for sanction to the borrowing of £13,000, repayable within ten years on the instalment system, to enable them to enter into an arrangement with the Gaslight and Coke Company for the improvement of street lighting within the borough. The arrangement entailed the payment to the Company of an amount of £1300 a year for ten years in respect of capital expenditure. The Council would not require to borrow any money for the purpose—the £13,000 being payable to the Company by instalments, without interest; but the District Auditor regarded such arrangements as being in the nature of loans requiring the Council's sanction. The Council had authorized similar arrangements in the past. The Committee were advised that the £13,000, which allowed £345 for scrap value of old lamps, was a reasonable sum; and they saw no objection to the desired sanction being given. They recommended: "That the borrowing by the Paddington Metropolitan Borough Council of £13,000 for street lighting within the borough be sanctioned; such sum to be repaid by yearly, half-yearly, or quarterly instalments of principal, or of principal and interest combined, of as nearly equal amounts as may be, within ten years from the date of the borrowing." The recommendation was agreed to without comment.

BURTON-ON-TRENT GAS UNDERTAKING.

The Purchase of the Barton-under-Needwood Works.

On behalf of the Local Government Board, Mr. Brightmore last Wednesday held an inquiry at Burton-on-Trent, regarding an application by the Corporation for a Provisional Order authorizing them to acquire the Barton-under-Needwood Gas-Works, and to carry out certain works in connection therewith.

In putting forward the case for the Corporation, Mr. Tinsley Jones said that, as far as Barton-under-Needwood was concerned, the Parish Council made no opposition; and all the local authorities were in agreement to support the application. The population of the village formed the basis of a valuable area for the consumption of gas. Giving statistics showing the area and population of the villages to be served, he pointed out that there were in Branstone 191 houses, and a population of 910; in Dunstall, 53 houses, and 281 people; and in Barton, 392 houses, and 1642 people. The Gas Company had been carrying on business since 1870, and had done so at a profit. The undertaking was in an improving position. The fully paid-up capital was £3300. It was the intention of the Corporation to make gas at Barton for a short time only, and then to supply the district from the Burton works—those at Barton being "scrapped." The undertaking was to be sold for £850; and to enable the Corporation to supply from Burton, it was necessary to lay a main to Barton along the Lichfield Road. The Burton gas undertaking was a very flourishing one; gas being supplied at 2s. 4d. per 1000 cubic feet, while the slot-meter consumers were allowed stoves and cookers—the rate being 3s. per 1000 feet inclusive. It was proposed to extend this latter facility to the Barton area. The Corporation recently expended £3000 on their works—every penny of this coming out of the profits; and they had agreed with the Company that, in cases where the Company would charge 5s. 6d. at Barton, the Corporation would charge 4s. per 1000 cubic feet, continuing, however, to charge meter-rents, as heretofore. The consumers of Barton would thus get a very substantial reduction; and the Corporation would risk no loss, but rather have a small gain. The prices were to be 4s. per 1000 cubic feet to ordinary consumers (3s. 11d. when the consumption was 100,000 feet and upwards); 4s. for public lighting; 3s. 4d. for gas-engines: and 5s. for prepayment consumers. These rates applied to Barton and Dunstall; while with regard to Branstone, the proposed charge was a little in excess of Burton, but lower than at Barton. The scale was 3s. 4d. per 1000 cubic feet to ordinary consumers (3s. 3d. for over 100,000 feet); 2s. 8d. for gas-engines; and 4s. 4d. for prepayment consumers. It was proposed by the Corporation to substitute the "Metropolitan" No. 2 burner for the "London" No. 1 for testing purposes—to which there would be no opposition; and they sought power to borrow £3514 for the purchase of the Barton works and the laying of the mains, and £10,000 to cover the cost of cookers and stoves over five years. Then £1486 was set down for contingencies; making the total amount required £15,000. It was suggested that the period of the loan be £11,500 for ten years, and £3500 for thirty years. The Corporation also sought power to provide their own coal-waggons. On thirty waggons which they had already bought out of revenue, at a cost of £2055, they had effected a saving of 6d. a ton on the coal; and allowing £300 for repairs, the total saving was £2465. Hitherto the Local Government Board had refused sanction to borrow for such a purpose, on the ground that the Corporation had no Act or Order under which they could do so. This power was now sought, so as to give the Board the necessary jurisdiction.

Evidence in support of the application was given by the Chairman of the Burton Gas and Electricity Committee (Alderman T. E. Lowe), the Consulting Engineer to the Corporation (Mr. J. F. Bell, of Derby), the Assistant Gas Manager (Mr. R. S. Ramsden), Mr. A. R. White, of Barton, and Mr. C. Harrison (a Director of the Barton Company).

IPSWICH GAS COMPANY'S RECORD YEAR.

Sir Daniel F. Goddard, M.P., presided at the annual meeting of the Ipswich Gas Company last week, and, in moving the adoption of the report and accounts, said the conditions of business for the past year had been exceedingly good. In fact, it had been a year of breaking records. They had made and sold more gas than ever before; and for the first time their revenue account had reached over £80,000, as compared with £60,000 in 1900. This large growth was due to the use of prepayment meters, which had now become so general. They had reconstructed one of the retort-houses which had been in use for a good many years, and put in up-to-date plant; and all this had been paid for out of the revenue account. The profit on the year was £14,338, which was large enough to permit of the payment of the statutory dividends. A reduction of 2d. per 1000 cubic feet in price, as from the commencement of the year, had been made both to ordinary and prepayment consumers; and this would mean a saving of nearly £4000 a year to the users of gas. The shareholders would naturally want to know how the Company expected to recoup themselves for this serious reduction in their revenue. They were anticipating better working results this year than they had ever had before. The new retort-house would help them; and they were constantly making effective improvements. Every 500 cubic feet more gas they made from a ton of coal meant an addition of £2000 to their revenue; and they were anticipating making more than 500 cubic feet increase in the production per ton. Then the item for repairs and maintenance, which had been so swollen in the past year, would be no longer so; and there would be a considerable reduction on this account in the next balance-sheet. They had effected new coal contracts in the present year very favourable to the Company; and they would save largely upon these. Every 3d. per ton reduction in the price of coal meant a gain to the Company of £445 on the year's working; and they had been able to make contracts which would give them an advantage of much more than 3d. per ton. Besides, they believed that there would be more consumers, and they would have a larger sale on this account. Considering all these things, he did not think they need fear that they would not make both ends meet, but rather he believed they would be able to pay the enhanced dividend they would have a right to pay, having made this reduction. There was just one little "fly in the ointment;" and when everything was so prosperous and flourishing with them, he thought he might venture to allude to it. They had renewed their lighting contract with the Corporation for two years. Hitherto they had had the contract for all the public lamps; but this year they had had to submit to a little reduction. The Corporation had taken 124 lamps from the public lighting contract, as they wished to light them with electricity. He was afraid this was only the "thin edge of the wedge;" and he had no doubt that if they succeeded in profitably supplying the public lamps with electric light, they would take a larger number off every time the contract was renewed. But the Company need not be afraid of this. They had a strong competitor in the electric light; and it was especially strong in Ipswich, because the electric light did not run under the same conditions as the Gas Company—being a Corporation supply. When it made a loss, they had nothing to do but to draw on the willing ratepayer and his bottomless purse to make up any deficiency. This had been going on now for some two or three years. He thought they would be pleased to learn that, notwithstanding this growing competition, the Company had never gone back in any one year. Much more gas was now being used for heating, power, and cooking purposes; and this enabled them to compete as they did with electricity. Then there was also high-pressure gas, for which they had laid mains in the principal streets of the town. Electricity for street lighting could not equal high-pressure gas. The report was adopted, the dividend declared, and the Chairman, the Secretary and Engineer (Mr. J. T. Jolliffe), and the staff were thanked for their services.

Redhill Gas Company.—Moving the adoption of the report and accounts at the annual meeting of the Redhill Gas Company, the Chairman (Mr. G. R. Hunt) said the business continued to grow satisfactorily, though on account of the mild weather there had not been the large increase in consumption hoped for. During the year, they had added 160 new consumers; and over 140 new stoves were sent out on hire. There was a considerable increase in both the sale of gas and residuals. The quantity of gas sold showed an increase of 2¼ million cubic feet over that of the previous year. The report was adopted, and dividends were declared of 10 per cent. on the share capital and 5 per cent. on the "B" stock, both less income-tax. A balance of £1075 would, after payment of these, remain to be carried forward.

Corporation Officials' Superannuation.—Mr. Fletcher W. Stevenson, the Engineer and General Manager of the Coventry Corporation gas undertaking, was among the speakers at the first annual dinner a few days ago of the Coventry and District Local Government Officers' Association. He said he hoped the Association would not be silent, as they required to make themselves heard, and let their wants be known. He believed it would be a good thing if superannuation could be given to all corporation officials and workmen, because the latter should certainly be included. Employers of labour and workmen should subscribe to a fund to be guaranteed by the State, so that they might claim, when they are too old to work, something to live upon. Some might get for their labour such remuneration as enabled them to make provision for themselves; but there were others—and they were in the majority—who could not do so. These should not be obliged to go hat in hand in old age, after they had done an immense amount of work, and beg what their then existing masters might choose to give them. Superannuation funds had been in existence for many years with railway, gas, water, and some manufacturing companies. There were also corporations—for instance, their big neighbour Birmingham—who had them. Therefore, if the Association succeeded in obtaining a scheme of this kind for themselves, they would have achieved one of the principal objects they had in view. With regard to the work of an organization of this description, it would certainly enable the members to know each other better, and he believed it would tend to greater efficiency in the public service.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

This afternoon was held what may now be regarded as the annual joint meeting of the Eastern and Western Districts of the Scottish Junior Gas Association. Last year the meeting place was at Falkirk, and the year before at the Carron Iron-Works. This year's meeting was at Airdrie, where something was to be learned about Mr. Vass's method of the revivification of oxide *in situ*. There was a most gratifying turn out of the members of the Association, as well as of members of the Airdrie Town Council. The process which Mr. Vass has devised, and which he follows in daily practice, was described by himself, and its working practically illustrated. It is needless to say that the visitors were greatly interested in the description. They were also shown, in their walk through the works, the boosting plant which has been introduced for the purpose of sending the gas down to a part of the area of supply which is on a lower level than the gas-works. These two items, in addition to a well-ordered gas-works which has been evolved in the course of the past seven years out of works in a considerably chaotic and neglected condition, formed material for a most profitable afternoon's engagement; and the entertainment which followed the tea provided by the Corporation gave the members opportunity for the fraternal intercourse which is the chief object of the joint meeting. This year's highly-successful gathering establishes more firmly than previous ones have done the advisability of holding joint meetings.

In Aberdeen, the Lighting Committee of the Town Council have begun experimenting with metallic filament lamps, with a view to their substitution for incandescent gas-lamps for street lighting. On Tuesday evening, they had a stretch of roadway in Albyn Place lighted by the new lamps. It is claimed for the metallic filament lamp that a much better light can be produced at a great saving of current and cost, as compared with the carbon filament lamp, and that when compared with the incandescent gas-lamp the cost is slightly more; but a great saving is effected in the maintenance of the lamps. The thirteen lamps erected in Albyn Place were spread over an area lighted by 23 incandescent gas-lamps. The gas-lamps were approximately of 40-candle power each. The metallic filament lamps which have been fitted up are: Three of 400-candle power, two of 200-candle power, two of 100-candle power, and the remainder of 150-candle power each; the object of the variation being to give an idea of the effect of the different grades. On Tuesday evening, the representatives of the Town Council who were interested in the experiment first inspected the thoroughfare under gas-light, then had the gas-lamps extinguished and the new lights turned on. They watched the effect of the change; and it is reported that it was generally admitted that the new lights were a distinct improvement. It was decided, however, that further experiment should be made, and that while the new lamps are to remain in Albyn Place, Fountainhall Road (which is a continuation of Albyn Place) will be lighted up by new Graetzin incandescent gas-lamps, in clusters of three 50-candle power lamps. The experiment in Albyn Place is to continue for a month, and then, it is stated, statistics will be submitted to show the relative cost of the lamps. We will wait anxiously to see these statistics. I have had some experience with metallic filament lamps of late; and it is the reverse of encouraging. In a place where 54 are installed, an electrician assured the ruling power that the saving in current would, before the end of a year, pay the whole initial cost of installing the lamps. So it will; but it will not pay for renewals. It is found that six lamps a week give way and require to be renewed; and as they cost over 3s. each, the weekly cost of renewals is more than £1. The installation of the metallic filament lamp has been a most ruinous step. Will the lamps behave better in the wind-swept streets of Aberdeen?

From Crieff, it is reported that, after part of East High Street had been laid with a material which is known by the name of Rocmac, many of the householders in the vicinity complained of escaping gas. It is believed that a heavy road-roller, which had been used in the work of laying the street, had drawn the joints of the gas-main. To put matters right, so far as the work has not yet been accomplished, it has been arranged that the Gas Company are to lay a new main before the road-laying operations are proceeded with further.

A week ago, there was excessive rainfall and extensive flooding in the central part of Scotland. I learn that at Kirkintilloch the town was so flooded that part of the area of gas supply was under 5 feet of water, and that the Gas Manager—Mr. J. Bell—required to employ a boat before he could reach some of the trap-boxes upon the gas-mains.

In the Grangemouth Town Council on Monday, Provost Mackay moved approval of the minutes of a Committee who had been considering the subject of the charge for public lighting, in connection with complaints which had been made of irregularities in the method of charging. Bailie White moved, as an amendment, that, on evidence, the Committee were satisfied that the charges for extra hours were never authorized by the Gas Corporation, nor agreed to by the Town Council. The Gas Manager had told them, he said, that he got instruction to charge for extra hours burned; but he failed to produce evidence of such instruction, either by minute or letter. Since 1906, the Town Council had been charged for gas for street lighting £341 more than they would have been by the old Gas Company. The Provost's motion was carried by 13 votes to 3.

Last October, a deputation representing householders in out burghs and districts waited upon the Water Committee of the Glasgow Corporation and made a representation with reference to the differential charge which is made for domestic purposes. The deputation represented a population of about 300,000, and property of the value of some £1,800,000. In their view, the differential charge is too great; consumers in the city being charged at the rate of 4d. in the pound rental, while consumers outside are charged at the rate of 10d. in the pound. The Water Committee, in a report which they have drawn up upon the subject, point out that the deputation took no account of the financial risk imposed upon, and undertaken by, the city of Glasgow in connection with the inception, completion, and maintenance of the water undertaking, or of the statutory provisions conceived in favour of the city as the complement and counterpart of that risk and responsibility

The Committee are of opinion that no good and sufficient reasons have been or can be submitted in support of the proposition that outside burghs and districts and the city should be placed on an equality as regards the domestic water-rate—a proposition which, if adopted, would necessitate an increase of the present city rate—or even in justification of the less ambitious proposal that the domestic rate outside the city should be reduced.

At the last meeting of the Ardrossan Town Council, Mr. Fawcett, the Convener of the Gas Committee, said that, with a view to increasing the consumption of gas in the town, the Gas Committee had resolved to ask the Council to consider a triple proposal—viz. (1) that an exhibition and demonstration of gas cooking be organized; (2) that the advisability of supplying gas-rings, grills, and cookers free of charge be considered; and (3) that the arrangements for the exhibition be left to the Gas Committee, with powers. These were the recommendations of the Committee after full consideration of the whole question. Personally, he was quite confident that they were on the right lines, and that, sooner or later, with the help of the consumers, they would be able to show very satisfactory results. They felt that unless something was done they must remain where they were, with gas always at a high price. The proposals now put forward were a step in the direction of a reduction. Mr. Fawcett then quoted some newspaper extracts to show that the experiment had been successful in other places. After some remarks, the proposals were agreed to. Arrangements have been made with Messrs. R. & A. Main, Limited, and Messrs. Falk, Stadelmann, and Co., Limited, for holding a cooking and lighting exhibition at the end of next month.

Water for Motor-Cars.—The legal department of the Royal Automobile Club is at present in negotiation with the Parliamentary Agents for a Bill which has been promoted by the Harrogate Corporation, in which the Corporation are seeking to obtain further powers with regard to water used in connection with motor-cars. The department hopes that, in view of the successful opposition to the Bradford Corporation Bill last year, it will be able to effect a satisfactory arrangement in the case of Harrogate, without the necessity of having to petition.

Barking Gas Company.—The report of the Barking Gas Company for the half year to Dec. 31 last shows a profit of £6087. After providing for fixed charges, there remains a balance (including interest received) of £5341, which, with an amount of £5023 brought forward, makes a total of £10,364 available for distribution, out of which the Directors recommend that the full statutory dividends on all classes of shares and £300 on account of back-dividends on the original shares be paid (all less income-tax), leaving £6304 to be carried forward. The sales of gas for the six months show an increase of 10 per cent.; and there has been an increase of 463 consumers in the half year. The price of gas was reduced on July 1 to 2s. 11d. per 1000 cubic feet to ordinary consumers, and 3s. 8d. to automatic meter consumers. An extraordinary general meeting of the proprietors will be held on the 9th prox., at the conclusion of the half-yearly ordinary general meeting, for the purpose of considering, and, if thought fit, approving, the Bill now before Parliament to authorize the acquisition by the Gaslight and Coke Company of the undertaking of the Company.

COAL TRADE REPORTS.

Northern Coal Trade.

There is an active coal trade for this season of the year, and the shipments continue to compare favourably with those of a year ago. In steam coals, best Northumbrians are from 9s. 6d. to 9s. 9d. per ton f.o.b., second-class steams are about 8s. 6d., and steam smalls are relatively steady at from 5s. to 6s. 3d. Work at the collieries is fairly good, and seems likely to be kept up for some little time to come. In the gas coal trade, the demand is full not only for the large distant users, but generally. Durham gas coals vary in price, according to quality. The usual classes are from 8s. 6d. to 9s. 4d. per ton f.o.b.; while for "Wear specials," up to 10s. 6d. is the current quotation. No large contracts have been settled for gas coal in the last few days; but one for about two cargoes, for best Durhams, for shipment to Porto Vecchio, for the Magona Works, is reported at about 16s. 6d. per ton delivered. There are also some others in the market for moderate quantities, for which full current prices are expected to be obtained. In coke, the market is steady. Good gas coke is quoted from 14s. to 14s. 6d. per ton f.o.b. in the Tyne or Wear.

Scotch Coal Trade.

The market remains unchanged, except that abnormally violent weather has been interfering with the shipping of coal. The home demand was somewhat better than for some weeks previously. The prices now quoted are: Ell, 9s. 6d. to 10s. per ton f.o.b. Glasgow; splint, 10s. to 10s. 3d.; and steam, 9s. 3d. to 9s. 6d. The shipments for the week amounted to 291,700 tons—a decrease of 14,778 tons upon the preceding week, but an increase of 16,716 tons upon the corresponding week last year. For the year to date, the total shipments have been 1,910,401 tons—an increase upon the corresponding period of 328 tons.

CURRENT SALES OF GAS PRODUCTS.

[For Table of "Tar Products Prices," see p. 632.]

LIVERPOOL, *Feb.* 25.

Sulphate of Ammonia.

The exceptionally good demand for all parcels which come on the market for near delivery has continued throughout the week, in spite of new orders for export generally not being plentiful. Japanese buyers, however, have made further considerable purchases, and this fact, together with the increased requirements for home consumption and the present low level of stocks, has rather accelerated the pace of the advance. The closing values are £14 3s. 9d. to £14 5s. per ton f.o.b. Hull, £14 5s. to £14 6s. 3d. per ton f.o.b. Liverpool, and £14 6s. 3d. to £14 7s. 6d. per ton f.o.b. Leith. For future delivery, makers are now quoting £14 per ton, f.o.b. at the best ports, in equal monthly quantities April-June, and £13 10s. for July-December; and it is reported that business has actually been done at these figures.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 583.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 14	5	Alliance & Dublin Ord.	81—84	..	5 19 1
374,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
200,000	5	Oct. 28	7	Bombay, Ltd.	6½—7	..	5 0 0
40,000	5	,,	7	Do. New, £4 paid	5—5½	..	5 1 10
50,000	10	Feb. 24	15	Bourne-mouth Gas & Water } 10 p.c.	28—29*	..	5 3 5
311,810	10	,,	7	Do. B 7 p.c.	16—16½*	..	4 4 10
75,000	10	,,	6	Do. Pref. 6 p.c.	14½—15*	..	4 0 0
380,000	Stk.	,,	12½	Brentford Consolidated	251—254*	..	4 18 5
330,000	,,	,,	9½	Do. New	196—199*	..	4 15 6
50,000	,,	,,	5	Do. 5 p.c. Pref.	118—120*	..	4 3 4
206,250	,,	Dec. 15	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
220,000	Stk.	Aug. 31	11	Brighton & Hove Orig.	220—223	..	4 18 8
246,320	,,	,,	8	Do. A Ord. Stk.	159—162	..	4 18 9
460,000	20	Sept. 29	10⅝	British	44½—45½	+½	4 13 6
109,000	Stk.	Feb. 10	6	Bromley, A 5 p.c.	116—118	..	5 1 8
165,700	,,	,,	4½	Do. B 3½ p.c.	87—89	..	5 1 2
82,278	,,	,,	5½	Do. C 5 p.c.	106—108	..	5 1 10
55,000	,,	Dec. 30	3½	Do. 3½ p.c. Deb.	84—86	..	4 1 5
250,000	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	95—97	..	4 2 6
100,000	10	—	—	Cape Town & Dis., Ltd.	3½—4½	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	6—6½	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	—	..	—
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	88—90	..	5 0 0
157,150	Stk.	Feb. 24	5	Chester 5 p.c. Ord.	107—109*	..	4 11 9
1,513,280	Stk.	,,	5,9/4	Commercial 4 p.c. Stk.	111—114*	..	4 15 10
560,000	,,	,,	5½	Do. 3½ p.c. do.	107—109*	..	4 17 10
475,000	,,	Dec. 15	3	Do. 3 p.c. Deb. Stk.	77—79	..	3 15 11
800,000	Stk.	,,	4	Continental Union, Ltd.	95—97	..	4 2 6
200,000	,,	,,	7	Do. 7 p.c. Pref.	136—138	..	5 1 5
492,270	Stk.	—	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	,,	—	4	Do. Deb. Stk.	104—105	..	3 16 2
148,995	,,	Oct. 14	5	East Hull 5 p.c. Ord.	103—105	..	4 15 3
486,090	10	Jan. 27	12	European, Ltd.	26—27	..	4 8 11
354,060	10	,,	12	Do. £7 10s. paid.	19½—20½	..	4 7 10
16,179,445	Stk.	Feb. 24	4⅜	Gaslight and Coke } 4 p.c. Ord.	105¾—106¾*	..	4 7 10
2,600,000	,,	,,	3½	Do. 3½ p.c. max.	85—87*	..	4 0 6
4,062,235	,,	,,	4	Do. 4 p.c. Con. Pref.	101—103*	..	3 17 8
4,531,705	,,	Dec. 15	3	Coke } 3 p.c. Con. Deb.	79—81	+1	3 14 1
258,740	Stk.	Sept. 15	5	Hastings & St. L. 3½ p.c.	94—96	..	5 4 2
82,500	,,	,,	6¼	Do. do. 5 p.c.	114—116	..	5 12 1
70,000	10	Oct. 14	11	Hongkong & China, Ltd.	17½—17⅝	..	6 4 0
131,000	Stk.	Sept. 15	7⅜	Ilford A and C	147—150	..	4 18 4
65,780	,,	,,	5⅛	Do. B	116—118	..	4 19 6
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
4,940,000	Stk.	Nov. 11	9	Imperial Continental	186½—188½	..	4 15 6
1,235,000	Stk.	Feb. 10	3½	Do. 3½ p.c. Deb. Red.	92—94	..	3 14 6
200,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	122—124	..	4 16 9
561,000	Stk.	Feb. 24	10	Liverpool United A	215—217*	..	4 12 2
718,100	,,	,,	7	Do. B	161½—163½*	..	4 5 8
306,083	,,	Dec. 30	4	Do. Deb. Stk.	102—104	..	3 16 11
75,000	5	Dec. 15	6	Malta & Mediterranean	4⅜—5	..	6 0 0
560,000	100	Oct. 1	5	Met. of } 5 p.c. Deb.	102—104	..	4 16 2
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	Nov. 11	3½	Monte Video, Ltd.	12⅜—13½	+¼	5 5 8
1,775,892	Stk.	July 28	4⅜	Newc'tle&G'tesh'd Con.	101½—102½	..	4 5 4
529,705	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	89—90	..	3 17 9
55,940	10	Aug. 31	7	North Middlesex 7 p.c.	13½—14½	..	4 16 7
300,000	Stk.	Nov. 30	8	Oriental, Ltd.	139—141	..	5 13 6
60,000	5	Sept. 15	8	Ottoman, Ltd.	6⅞—7¼	+¼	5 10 4
31,800	53	Feb. 24	13	Portsea Island A	130—132*	..	5 3 8
60,000	50	,,	13	Do. B	123—125*	..	5 4 0
100,000	50	,,	12	Do. C	116—118*	..	5 1 8
114,800	50	,,	10	Do. D and E.	101—103*	..	4 17 1
398,490	5	Oct. 28	7	Primitiva Ord.	7 1/16—7 1/8	+ 1/16	4 8 2
796,980	5	Dec. 30	5	Do. 5 p.c. Pref.	5¼—5½	..	4 10 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
312,650	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	95—97	..	4 2 6
250,000	10	Sept. 29	9	San Paulo, Ltd.	15⅜—16	..	5 12 6
115,000	10	,,	6	Do. 6 p.c. Pref.	11⅞—12¼	..	4 18 0
125,000	50	Jan. 3	5	Do. 5 p.c. Deb.	50—51	..	4 18 0
135,000	Stk.	Aug. 31	10	Sheffield A	234—236	+2	4 4 9
209,984	,,	,,	10	Do. B	234—236	+3	4 4 9
523,500	,,	,,	10	Do. C	233—235	+2	4 5 1
70,000	10	Oct. 14	6	South African	10⅜—11	..	5 9 1
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	119—121	+½	4 10 3
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	79—81	+½	3 14 1
209,820	Stk.	Aug. 31	8	South Shields Con. Stk.	156—158	..	5 1 3
605,000	Stk.	Feb. 24	5⅜	S'th Suburb'n Ord. 5 p.c.	117½—119½*	..	4 14 9
60,000	,,	,,	5	Do. 5 p.c. Pref.	118—120*	..	4 3 4
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	122—124	..	4 0 8
502,310	Stk.	Nov. 11	5	Southampton Ord.	111—113	..	4 8 6
120,000	Stk.	Feb. 10	7	Tottenham and } A 5 p.c.	141—143	..	4 17 11
483,940	,,	,,	5½	} B 3½ p.c.	115—117	+1	4 14 0
149,470	,,	Dec. 15	4	Edmonton } 4 p.c. Deb.	98—100	..	4 0 0
182,380	10	Dec. 30	8	Tuscan, Ltd.	9—9½	..	8 8 6
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	98—100	..	5 0 0
236,476	Stk.	Aug. 31	5	Tynemouth, 5 p.c. max.	114—115	..	4 6 11
255,636	Stk.	Feb. 24	6¼	Wands- B 3½ p.c.	140—142*	..	4 15 1
85,766	,,	Dec. 30	3	worth 3 p.c. Deb. Stk.	73—75	..	4 0 0

Prices marked * are "Ex. div."

Nitrate of Soda.

The quotations for this article continue to be given as 9s. 9d. per cwt. for ordinary and 10s. for refined quality, on spot; but the tone of the market seems to be hardly so good.

LONDON, *Feb.* 27.

Tar Products.

The markets for tar products have remained fairly firm; but on the whole business has been rather quiet during the past week. In pitch, though buyers will not pay the prices asked at present, manufacturers are still fairly firm in their ideas of value. Benzols do not appear to be quite so firm, and there is a little more stuff offering. Crude carbolic remains very firm, and even at the present prices distillers are not offering. There is nothing fresh to report in creosote.

The average values during the week were: Tar, 17s. 9d. to 21s. 9d., *ex* works. Pitch, London, 35s. 6d. to 36s.; east coast, 35s. 6d. to 36s. 6d.; west coast, Manchester, 35s. 6d. to 36s. 6d., Liverpool, 36s. to 36s. 6d., Clyde, 36s. to 37s. Benzol, 90 per cent., casks included, London and North, 9¾d. to 10d.; 50-90 per cent., casks included, London and North, 9d. to 9¼d. Toluol, casks included, London, 9¾d.; North, 9¼d. Crude naphtha, in bulk, London, 4d. to 4¼d.; North, 3¾d. to 3¾d.; solvent naphtha, casks included, London, 11¼d. to 1s.; North, 10¾d. to 11d.; heavy naphtha, casks included, London, 11⅜d. to 1s. 0½d.; North, 10⅜d. to 11d. Creosote, in bulk, London, 2¼d. to 2⅜d.; North, 1⅝d. to 2d. Heavy oils, in bulk, 2⅜d. to 2⅝d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 7d. to 1s. 8d.; west coast, 1s. 6½d. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 45s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market is very strong, and further improved prices have been paid. Actual Beckton is quoted £13 12s. 6d. Outside London makes are £13 10s. In Hull, £14 2s. 6d. is the price; Liverpool, £14 3s. 9d. to £14 5s.; Leith, £14 5s.; and Middlesbrough, £14 2s. 6d.

A parish meeting was held at Dunmow last Wednesday to consider the advisability of asking the District Council to take over the water-works which were recently provided for the town by the Mid-Essex Water Company, now in liquidation. Mr. W. Hasler, the Chairman of the Parish Council, said the Receiver had offered the water-works to the District Council, but had stated no price. The Parish Council had passed a resolution to the effect that it would be advisable to purchase the works if a satisfactory price could be agreed upon, subject to the sanction of the Local Government Board. It was stated that very few householders had had the Company's water laid on, as they had wells and pumps of their own. After some discussion, it was decided to adjourn the question until the District Council ascertained what the cost of taking over the water-works would be.

Kensington Public Lighting.—It has been decided by the Works Committee of the Kensington Borough Council to recommend the adoption of an improved scheme of street gas lighting in the borough, at a cost of £13,960 per annum, to be carried out by the Council's own lighting department.

Reductions in Price.—The Shanklin Gas Company have reduced the price of gas 2d. per 1000 cubic feet from the close of the current quarter. The Winsford (Cheshire) Urban District Council have reduced the price of gas 3d. per 1000 cubic feet; making the net prices 2s. 9d. for lighting and heating and 2s. 3d. for power. This is the second reduction (6d. in all) in twelve months; and it will apply to the consumption in the current quarter. The Southgate and District Gas Company have reduced the price of gas from 3s. 6d. to 3s. 4d. per 1000 cubic feet as from the 31st prox.; and the price of the North Middlesex Company's gas will be lowered by 2d. per 1000 cubic feet as from the same date.

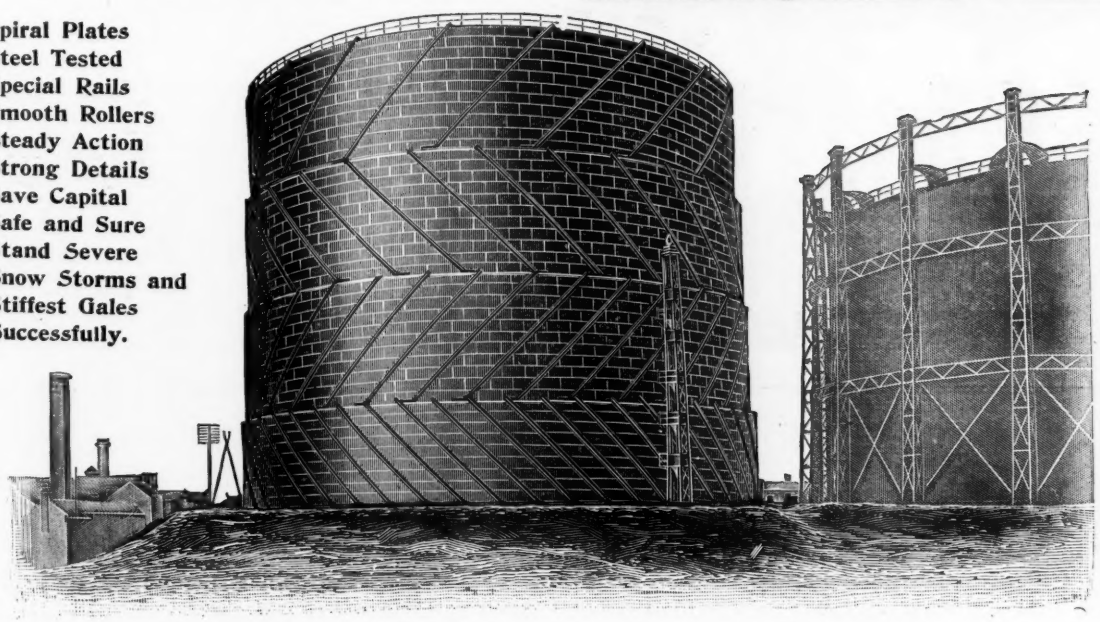
Reductions at Carmarthen.—Presiding at the annual meeting of the Carmarthen Gas Company, Mr. John Lewis, the Vice-Chairman, stated that, although the Company reduced the price of gas from 4s. 1d. to 3s. 9d. per 1000 cubic feet last year, they were in the happy position of being able to continue the same dividend. He was also glad to be able to state that the Directors intended to further reduce the price of gas by 3d. per 1000 cubic feet, thus bringing it down to 3s. 6d., as from April 1 next. The decrease of 725,000 cubic feet in the consumption was to be expected, owing to the fact that electric light had been adopted for public lighting purposes. However, the private lighting showed an increase; and, by studying economy in every department, they hoped to do better. Dividends were declared of 7½ per cent. per annum on the ordinary shares and 7 per cent. on the new shares.

Extension of the Torquay Water-Mains.—An inquiry was held at Torquay last Wednesday by Major J. Stewart, R.E., with reference to an application made by the Town Council for the sanction of the Local Government Board to a loan of £2825 for works of water supply. Mr. S. C. Chapman, the Water Engineer to the Corporation, explained that difficulty was experienced in supplying the higher part of the St. Mary Church district during the summer months, owing to the rapid growth of the area; and it was proposed to lay, at a cost of £825, a 10-inch main from the Warberry reservoir to the district. The balance of the loan was required for extensions of mains, the expenditure on which had been from £600 to £700 a year for the last few years. Mr. Chapman added that the average daily consumption of water in the district supplied was about 34 gallons per head. It was greatest in Torquay, where about 40 gallons per head were used daily; while in Newton Abbot it was 23 gallons per head. The difference was accounted for by the fact that there were many more large houses in Torquay than in Newton Abbot. Mr. F. S. Hex, the Town Clerk, said Torquay was extending rather rapidly; and the Town Council thought it better to have a sort of running authorityfor t he extension of mains, instead of having to do the work and apply for sanction afterwards.

R. & J. DEMPSTER, LIMITED, MANCHESTER.

Leading Makers of SPIRAL GUIDED GASHOLDERS.

Spiral Plates
Steel Tested
Special Rails
Smooth Rollers
Steady Action
Strong Details
Save Capital
Safe and Sure
Stand Severe
Snow Storms and
Stiffest Gales
Successfully.



From a Photograph showing the conversion of a Two-Lift Guide Framed Holder to a Four-Lift Spiral Holder of 3½ million cubic feet capacity, for the Newcastle and Gateshead Gas Company, to Plans and Specifications of W. D. GIBB, Esq., M.Inst.C.E., Engineer.

Increased Gas-Storage Contracts.

Messrs. Ashmore, Benson, Pease, and Co., Limited, of Stockton-on-Tees, have orders in hand for gasholders with steel guide-framing for Tokio (Japan), Vancouver (British Columbia), Manchester, and Birchenwood (England) totalling over 15,500,000 cubic feet capacity. The Manchester holder, which is well advanced, has been referred to in recent articles in the "JOURNAL." The other large holders for Tokio and Vancouver have very substantial guide-framing. Both have four lifts and steel tanks, and have been specially designed by the contractors to meet climatic conditions.

Quality of the Gas at Bingley.—On the minutes of the Gas Committee coming before the Bingley Urban District Council, Mr. Laycock asked if any complaints had been received as to the heavy increase in the consumption of gas by ratepayers during the last half year, and also if there had been complaints of the unsatisfactory quality of the gas. He said he had been told by many people whose habits were regular and methodical that their gas accounts were higher than they had been for years past. Mr. Rushforth (the Chairman of the Gas Committee) replied that, if the large consumers were left out of account, the total increase in the consumption was about 4 per cent.; and he thought one reason, perhaps, why people were burning more gas was that they were not so careful about it now that it was cheap as they were when it was dearer. As to the quality, this had averaged 16½ candles for many months. There had been a suggestion that gas was being sent out at a higher pressure; but this was incorrect. Mr. Laycock said the answer was not at all satisfactory. It was rather singular that so many persons should have larger gas bills than they had had for years; and from his own experience, he could testify that the quality of the gas had not been so good as in the past.

Chichester Gas Company.—Addressing the shareholders of the Chichester Gas Company at the half-yearly meeting, Mr. W. A. Walker (who, as already stated in the "JOURNAL," has succeeded Mr. Alfred Lass as Chairman) pointed out that the working results were very satisfactory; the sale of gas per ton of coal carbonized being 11,069 cubic feet—a record for the Company. The capital employed per 1000 cubic feet of gas sold was also well below the average. The report was adopted, with dividends for the half year at the rate of 9 per cent. per annum upon the "A" capital stock, and £6 6s. per cent. per annum on the "B" and "C" capital stocks—all less income-tax. A cordial vote of thanks was passed to Mr. Lass for his past services. An extraordinary meeting was subsequently held for the purpose of giving the necessary consent to the promotion of the Company's Bill seeking powers for the extension of their area of supply and for the raising of further capital. The details of the Bill were explained; and in reply to a question, the Chairman said it was by no means the intention of the Company to put in force the additional powers they might obtain until the business likely to accrue from taking up such powers was such as to be profitable. The Bill was approved.

A Lower Price at Newmarket.

The report which was adopted at the annual meeting of the Newmarket Gas Company stated that the net balance of profit earned during 1910 was £4624. Debenture interest amounted to £162; and deducting this and adding £2590 brought forward, made £7052 standing to the credit of the profit and loss account. The Directors recommended that a dividend at the rate of 6⅝ per cent. (less income-tax) be paid upon the original consolidated stock; that £600 be carried to the insurance fund; and the balance, £2780, carried to next year's account. The Directors had resolved to reduce the price of gas from the beginning of 1911 from 3s. 8d. to 3s. 6d. per 1000 cubic feet to ordinary consumers, and from 3s. 4d. to 3s. 2d. for motive power; and the discounts on slot-consumers' accounts would be increased to 5d. per 1000 feet. The Bill which the Company promoted in the last session of Parliament, in co-operation with 48 other gas companies, for the purpose of authorizing the new "Metropolitan" argand burner No. 2 as the standard burner for the official testing of illuminating power, had received the Royal Assent, and come into operation on Jan. 1. The Chairman (Mr. R. Stephenson, J.P., D.L.) referred to the fact that the insurance fund, to which they had of late been carrying £600 per annum, had practically reached the required sum of £3000. This enabled the Company to reduce the price of gas by 2d. per 1000 cubic feet. This concession would cost the Company £500, of which, under the sliding-scale, the consumers received £350 and the shareholders £150. This showed that practically three-fourths of any increase in profits went, under the sliding-scale, to the consumers—a fact which was not generally recognized.

South Staffordshire Mond Gas Company.—Presiding at the annual meeting of the Company, Mr. G. Macpherson stated that there was a continued increase in each section of their work—the manufacture of gas, recovery of residuals, quantity of gas sold, average price obtained for it, and also in the prices secured for the residuals. The increase in the revenue was £4363; and the gross profit was £4228, compared with £860 for the previous year. This result had been obtained with only about half the plant at work during nearly the whole year. The net result of the working was a profit of £358 to be carried forward. They had now 106 customers—15 more than in January last year. The demand for gas for some months had been increasing at such a rate that last year the Board gave instructions for plans and estimates to be prepared for the extensions necessary to enable them to supply the volume of gas which it was considered would be wanted by the time they were completed, and also for the probable requirements for some time ahead. The gas sold was 22 per cent. more than in the previous year. The quantity distributed in January was the greatest yet sent out of the works; and the outlook for the present year was distinctly good. Their customers were increasing the consumption where they could; and inquiries were being received from others who were considering taking the gas.

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Old Broad Street,
LONDON, E.C.

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LEST YE FORGET.

Holmfirth Gas Supply.

The report of the Engineer, Manager, and Secretary of the Holmfirth Gas Company (Mr. Arthur E. Buckley) for the year ended Dec. 31, 1910, which was recently submitted to the Directors, shows that the quantity of gas made was 27,193,000 cubic feet, or at the rate of 11,274 cubic feet per ton of coal carbonized, compared with 10,810 cubic feet in 1909. The quantity sold was 25,392,200 cubic feet, against 24,075,300 cubic feet before—an increase of 5·46 per cent.; and there was a decrease of 47,900 cubic feet in the gas used on the works and unaccounted for. The increased gas sold (1,316,900 cubic feet) was divided as follows: Private consumers, 278,100 cubic feet; mills, 454,900 cubic feet; engines, 356,300 cubic feet; and stoves, 227,600 cubic feet. The total income for the year amounted to £5240, compared with £5008; the expenditure being £3734, against £3323. The increase in the expenditure (£410) includes extensions and alterations to purifiers, washer, &c., costing £400. The result of the year's working was a balance of £1506; and this with the balance on the profit and loss account produced a sum of £2358 available for distribution. At the annual general meeting, a dividend of 10 per cent. was declared; and the reserve fund was made up to £1000. In proposing a vote of thanks to Mr. Buckley, the Chairman said the past year's results were the best in the Company's history. An exhibition of gas appliances was held in the district for eight weeks, and it was a distinct success; 70 consumers being added to the books. There are now in daily use 400 cookers and boilers, 400 grillers, 480 boiling-rings, and 40 gas-engines.

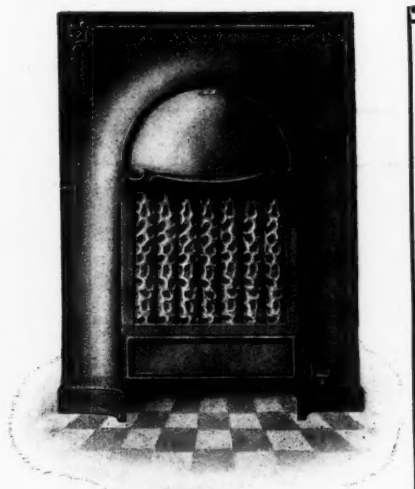
Preston Gas Company's Order.—The Fulwood Urban District Council have decided to abandon opposition to the proposed Provisional Order of the Preston Gas Company; a letter having been received from the Company stating that if the Council did so the Company would undertake that the price to be charged by them for the supply of gas within the township of Fulwood should be the same as the price for the time being charged for the supply of gas within the borough of Preston—this undertaking being subject to anything which may be imposed upon the Company by the Board of Trade.

Public Lighting of Norwich.—The Norwich Town Council have authorized the Clerk to enter into a contract with the British Gaslight Company for the public lighting of certain parts of the city from the expiration of the present contract. It was pointed out that this contract was for the lighting of the two-thirds of the city that would not be lighted by electricity. In moving the resolution, Mr. F. C. Havers said the existing contract expired on Oct. 1 next. There were to-day some 2290 lamps in the city; and the new contract would affect some 1500 of them. It was proposed that the contract should be for a term of three years; but if electric lamps were substituted for gas-lamps in any of the districts, they would automatically drop out of the contract, and cease to be paid for. The price would remain the same as in the expiring contract.

Enfield Gas Company.—The accounts of this Company for the six months ended Dec. 31 last, which were presented at the half-yearly general meeting last Tuesday, show that the revenue was £25,982, against £24,406 for the corresponding period of 1909; the expenditure £20,042, compared with £18,931; and the balance carried to the profit and loss account £5940, against £5475. The sum available for distribution was £15,296; and the Directors recommended the declaration of dividends for the half year at the rates of 5 and 5½ per cent. per annum upon the preference and ordinary stocks, both less income-tax. These dividends will absorb £3915, and leave £11,381 to be carried forward.

Brighton and Hove Gas Company.—At the half-yearly general meeting of the Company last Friday, the Directors reported that, as compared with the six months ended Dec. 30, 1909, the sale of gas in the second half of last year increased by 19,776,000 cubic feet, or 3·1 per cent.; and the revenue from residual products was £2894 more. The accounts accompanying the report showed that the total revenue was £125,271, and the expenditure £90,244; leaving £35,027 to go to the profit and loss account. There was a sum of £43,382 available for distribution; and the Directors recommended the payment of dividends for the half year at the statutory rates of 6 and 4 per cent. per annum on the preference stocks, and 11 and 8 per cent. per annum on the original and ordinary stocks. These would absorb £23,627, and leave a balance of £19,755 to be carried forward. As already announced in the "JOURNAL," the price of gas in Brighton, Hove, Preston, and Aldrington has been reduced 1d. per 1000 cubic feet as from the beginning of the year.

Erdington Garden City Scheme.—The "Birmingham Mail" understands that the Birmingham Gas Committee will shortly lay before the City Council proposals for disposal of a large tract of land at Birches Green, Erdington, which was purchased some years ago for the purpose of a gas-works. When the project became known, considerable opposition was raised by the inhabitants of Erdington; and when the matter came before Parliament, the Erdington District Council were successful in their opposition to the erection of gas-works on the site in question. Notwithstanding this, the Gas Department retained the land in the expectation of being in a position to utilize it at a subsequent period. This was the position of affairs when the Greater Birmingham scheme was launched; and in consideration of Erdington accepting Birmingham's terms of annexation, Birmingham definitely undertook to relinquish the idea of erecting gas-works in the Erdington area. Since then, the Gas Department have acquired land between Bromford and Saltley for the erection of any additional gas-works which may be necessary in the near future. Consequently, the Gas Department had no longer any object in holding the land; and being advised that they had to dispose of it, the Gas Committee are now proposing to transfer it to a syndicate to develop on garden city lines. The area of the land is 120 acres; and when purchased in 1902 was secured at what was generally regarded as the low price of £18,000.



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The Brick, Burner, Fuel and Fuel guard all drop into their places and need no screws or fastenings to keep them there. The total number of Screws employed in the fitting of the fire only amount to half those used in any other fire.

Consumption for consumption the radiating efficiency of our new patent fuel is greater than that of any other type of Fuel. In addition, the fumes cannot escape into the room, as the fuel guides them right into the canopy.

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WORKS: Gothic Works, EDMONTON, N.; and Gothic Ironworks, FALKIRK.
SHOW-ROOMS: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 13, Whitworth Street West, MANCHESTER; and 333, Queen Street, MELBOURNE.

Calcutta Lighting Contract.

Messrs. Thomas Glover and Co., Limited, have been successful in obtaining, in open competition, the order for 3000 street lanterns for the Calcutta Corporation.

Annfield Plain Company's Increased Dividend.

A satisfactory condition of affairs was revealed by the report for the year ending Dec. 31 last, which was submitted at the general meeting of the Annfield Plain and District Gas Company, held last Wednesday, at No. 50, Cannon Street, E.C. It stated that there was a net profit, after providing every charge against the year's working, of £2636. After payment of interest on the loan capital and the interim dividends for the half year to June 30, there remained a balance of profit available for dividend amounting to £1216, from which the dividend on the preference shares for the six months to Dec. 31 had been paid. The Directors recommended that a dividend be declared on the ordinary share capital at the standard rate of 7 per cent. for the twelve months to Dec. 31 (on account of which an interim dividend at the rate of 6 per cent. per annum had been paid for the half year to June 30), and that the balance of £167 be carried forward. The Chairman (Mr. W. A. Schultz, F.C.A., J.P.), in moving the adoption of the report and accounts, said it was the first occasion on which he had had the pleasure of putting before the shareholders accounts which were so satisfactory that the Board were able to ask them to declare the standard dividend of 7 per cent. for the year. When the works were taken over from the old Companies, they required a good deal of alteration and improvement; but now they would not be ashamed for any gas engineer to go to Annfield Plain and Dipton and inspect them. New consumers had been coming on in a very satisfactory manner. The number had increased during the year by 437, or 21 per cent.; there being at Dec. 31 a total of 2540 consumers. The price of gas to ordinary consumers had been levelled-down to 3s. 10d. per 1000 cubic feet as from Jan. 1 of this year. The net profit of £2636 compared with £2000 for the previous year; and in addition to carrying forward £167, they were placing £158 to the reserve fund. The output of gas was 30,296,963 cubic feet, against 27,662,240 feet, or an increase of 2,654,723 feet. The quantity sold was 23,557,000 cubic feet, compared with 21,305,200 feet, or an increase of 10 per cent. The unaccounted-for gas amounted to 18 per cent.; but, of course, the Company operated in a mining district. They had improved this item, though they had not yet reached their ideal. Already their leakage compared favourably with that of other undertakings in the immediate neighbourhood; but they hoped, by careful watching and examination of the mains from time to time, to bring the figure down to a still more satisfactory level. The sale of gas, including public lighting, produced £4755, against £4345; while the total revenue was £6333, compared with £5563, or an increase of £770. A coal contract for eighteen months had been entered into, which would save the Company 1s. 3d. per ton, or about £200 over the year; and a sulphate plant erected and put into action last August had already yielded a profit of £77. Of coke, 44 tons more had been sold; the average price being 8s. 11d., against 7s. 11d. for the previous year. It would be remembered that the works at Bustybank, Burnopfield, were acquired during the progress of the Bill through Parliament; and the Company were now about to enter on a scheme for linking-up these works with those at Dipton, by which means they expected to make a considerable saving in the cost of supply. They also looked for a large increase in consumption, as there were a great number of houses waiting to be connected which, with the present plant at Bustybank, they were unable to supply with gas. They were, therefore, proposing to lay the connecting main and erect the necessary increased plant at Dipton, with a booster, so as to give the neighbourhood of Burnopfield all the gas it required. The estimated cost of this was about £6500. The estimated profit at Burnopfield for the year 1909 was £48, or only 2 per cent. on the original capital outlay; but reckoning the sale of gas under the new scheme at 6,000,000 cubic feet, and the profit on this at £650, there would be a return of about 10 per cent. on the new outlay, or 7 per cent. on the total capital of £8822. In addition to this, the extra capital it was proposed to raise would provide plant for making gas available for Dipton and Kyo to an increased extent of 9,000,000 cubic feet. The Directors altogether looked forward to the future with hopefulness. The report was adopted. Mr. M. M. Hobson, the local Director, expressed the opinion that the new scheme was urgently required; and Mr. King Hiller, who asked some questions, said the increase of 2 per cent. in the dividend in one year was most satisfactory. Thereafter, the dividend was declared, the retiring Directors (Messrs. Schultz and H. C. Walker) and Auditors (Messrs. Davies Bros.) were re-elected, and a sum of £150 was voted to the Directors for their services. A vote of thanks was accorded to the Chairman and Directors, the Managing-Director (Mr. Charles Comins, F.C.A.), the Secretary (Mr. W. H. Kent), the Manager (Mr. C. L. Ireland), and the staff; and at a special general meeting held subsequently, the Directors were authorized to raise additional capital by the issue of 300 ordinary shares of £10 each.

A Lower Price at Canterbury.—The Directors of the Canterbury Gas and Water Company, in their half-yearly report, intimate that the price of gas is to be reduced from 2s. 9d. to 2s. 8d. per 1000 cubic feet, to take effect from Jan. 1 last. This represents a concession to the consumers of £420 per annum. The Directors recommend a dividend making, with the interim dividend, £8 17s. 6d. per cent. for the year.

Rossendale Union Gas Company.—The half-yearly report of the Directors of the Rossendale Union Gas Company shows that the sales of gas registered an increase of 4¾ per cent. as compared with the quantity sold in the corresponding half of the previous year. The profit on the six months was £6090 on an income of £22,194. The sum received from sales of gas was £16,994; and residual products realized £4572. In manufacture, salaries, repairs, &c., £11,483 was expended; while rents, rates, and taxes absorbed £2048. The Directors recommend payment of the statutory dividends, ranging from 10 to 5 per cent. on the several classes of shares.

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Supplied in various Finishes.

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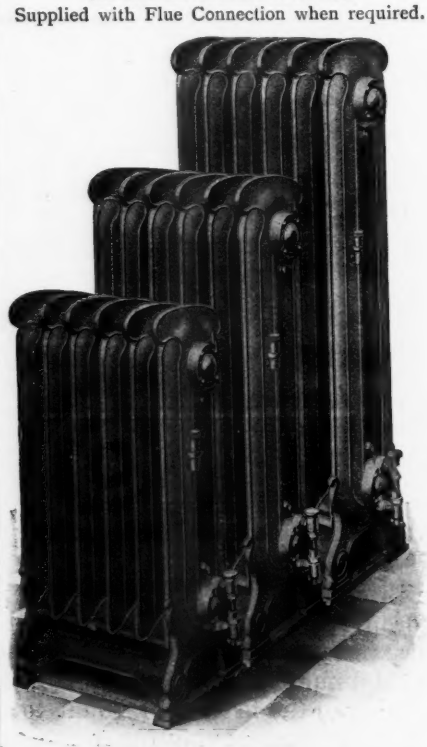
THE WELL-KNOWN
GAS-HEATED STEAM RADIATOR
(SINGLE OR DOUBLE COLUMN).
Supplied with Flue Connection when required.



THE
PARKINSON STOVE CO., LTD.
(Incorporating Maughan's Patent Geyser Co.),
BIRMINGHAM & LONDON.

A short time ago, we reported a great outburst of natural gas at Bergedorf, near Hamburg. According to a United States consular report, the quantity now escaping is 20 million cubic feet per 24 hours.

The Gas Committee of the Coventry Corporation have resolved to provide three new station governors, with valves and connections, and to erect a building to accommodate them at the estimated cost of £2500.

Owing to a recent abnormal rise of water in the Seine, the river bank skirting the town of Suresnes, near St. Cloud, gave way for a distance of nearly 100 yards. In connection with the collapse, a water-main burst, and the local supply of drinking water had to be cut off for 48 hours.

We learn that Messrs. Stewarts and Lloyds, Limited, of Glasgow and Birmingham, have just secured an order for 2000 feet of Mephan-Ferguson lock-bar pipes for the water supply of Montreal. The pipes are to be 72 inches diameter and ⅜ inch thick. They will be supplied in 28-feet lengths, each weighing more than 4 tons.

The Gas Committee of the Coventry Corporation have had under consideration a communication from the Institution of Gas Engineers, asking the Committee to agree to pay an additional subscription to the Institution, in order to further the work of a Publicity and Special Purposes Committee. The Committee say they are not prepared to agree to any alteration in the present basis of subscription.

At an inquest on the body of the Rev. Dr. Frederick W. Quilter, Rector of Waddington, it was stated that deceased, who was 78 years of age, died as the result of injuries received by the explosion of an acetylene gas plant. Some defect had been pointed out to him; and he was examining the interior of the apparatus by the aid of a lighted taper, when the explosion occurred. He was struck by a portion of the plant; and his skull was fractured either by this or by the consequent fall.

The half-yearly conference of the representatives of the Richmond Gas Stove and Meter Company, Limited, was held on Tuesday and Wednesday of last week at Warrington, when general matters and future developments in connection with the Company's business were exhaustively discussed—a prominent feature being their entirely new series of water-heating appliances. As is well known, the Company have manufactured water-heaters for many years, and realizing the possibilities of future developments, Messrs. Richmond decided some two years ago to entirely re-organize this department. This has now been done; and latest and most up-to-date machinery is used for the manufacture—the whole being under the supervision of an expert whose experience in American and Continental, as well as English methods of water-heating, have resulted in the production of a complete series of appliances for the heating of water both for domestic and industrial purposes. Everything has been carefully and fully tested in the laboratories of the Company, which, as already mentioned in these columns, are now under the supervision of Dr. Harold G. Colman. The fullest details will shortly be at the disposal of all interested in this important subject.

APPLICATIONS FOR LETTERS PATENT.

3551.—Streete, A., "Utilization of waste heat from gas-fires." Feb. 13.
3564.—Thomas, L. J., "Artificial fuel." Feb. 13.
3578.—Peebles, A. C., and Muir, R. W., "Gas-engines." Feb. 13.
3587.—Round, J. C., "Cocks or valves." Feb. 13.
3597.—Chandler, S. & S. B., "Prevention of robberies from prepayment meter coin-containers." Feb. 13.
3606.—Meads, J. A., "Controlling the supply in conduits for gas and water." Feb. 13.
3640.—Yates, H. J., "Gas-furnaces." Feb. 13.
3678.—Trefois, L., "Valves for gas-pipes." Feb. 14.
3742.—Graddon, C., and Blumenau, J., "Burner." Feb. 14.
3808.—Alcock, J., and Crossley, F., "Mantles." Feb. 15.
3905.—Walshaw, J. A., "Incandescent lighting." Feb. 16.
3910.—Milne, J., "Rotary compressors." Feb. 16.
3921.—Laidlaw, R., and Son (Edinburgh), Limited, and Mackenzie, J., "Prepayment meters." Feb. 16.
3931.—Dunphy, A. L., "Inverted burners." Feb. 16.
3933.—Southon, J. C., "Automatic meters." Feb. 16.
3964.—Tooth, L. F., "Carrying mantles." Feb. 16.
3969.—Smith, C. H., "Incandescent lamps." Feb. 16.
4006.—Still, W. M., and Sons, Limited, Adamson, A. G., and Kitson, A. J. D., "Incandescent lamps." Feb. 16.
4007.—Still, W. M., and Sons, Limited, Adamson, A. G., and Kitson, A. J. D., "Burners." Feb. 16.
4047.—Lewis, G. P., and True, C. L., "Manufacture of gas in retorts." Feb. 17.
4070.—Dickin, N., "Gas-compressor." Feb. 17.
4091.—Trefois, L., "Gas-generating apparatus." Feb. 17.
4095.—Walliker, G. S., "Gas-burners." Feb. 17.
4102.—Powell, F., "Gas-stoves." Feb. 18.
4106.—Gunning, J., "Lighting and extinguishing lights at predetermined times." Feb. 18.
4114.—Sinclair, J., and Baird, H. A., "Coal-conveyors." Feb. 18.
4144.—Benn, C., "Bottoms of stills used in gas, tar, and the like works." Feb. 18.
4160.—Affleck, G. B., "Gas ovens and cookers." Feb. 18.
4171.—Rousseau, L., "Regenerative furnaces." Feb. 18.
4187.—Bayeux, R., and Richard, J., "Reducing the pressure, measuring the volume, and regulating the delivery of gases under pressure." Feb. 18.

Restoration of Lapsed Patent.

An order was made on Feb. 16, 1911, restoring the letters patent granted to A. J. Lyon and G. F. Whitmore for "Improvements in apparatus used for lighting," No. 4383 of 1905.

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GAS MANTLE

THE STRONGEST MANTLE ON THE MARKET.

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Best and Cheapest for Street Lighting and Maintenance Work.

Samples Free for Testing Purposes.

Entirely British Made.

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The first of the series of lectures arranged by the London and Suburban Ironmongers will be given at the Holborn Restaurant next Thursday evening; the subject being "Modern Gas-Fires and Gas-Fixing" by Mr. H. H. Creasey.

John Evans, a retired hotel-keeper of Pontypridd, was found lying on his bed with a piece of gas-piping near him. One end of this pipe was fixed to the gas-burner; and the gas was turned on. The Coroner's Jury returned a verdict of "Suicide during temporary insanity."

TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending Feb. 25. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.		Glasgow.
					Liverpool.	Manchester.	
Tar crude	per ton	22/6	19/6 22/6	19/3 22/9	20/- 22/-	20/- 22/-	—
Pitch	,,	37/-	37/6	37/-	38/6 39/-	37/- 37/6	36/- 37/-
Benzol, 90 %	per gallon	-/11	-/9½	-/9	-/8½	-/9	-/10
Benzol, 50-90%	,,	—	-/10	-/9¼	-/8¼ -/8½	-/9	—
Toluol, 90%	,,	—	-/9¼	-/10	-/10	-/9¾ -/10	-/9¾
Crude naphtha, 30%	,,	—	-/3⅛	-/3⅛	-/3¼ -/3¾	-/3¾ -/4	—
Light oil, 50%	,,	—	-/3⅛	-/3¾ -/4	-/3½	-/3¾	—
Solvent naphtha, 90-160	,,	—	-/10½ -/11	-/10	-/10¼	-/11	-/11
Heavy naphtha, 90-190	,,	—	-/11	-/11½	-/11 -/11¼	-/11½	-/11
Creosote in bulk	,,	-/2¼ -/2¾	-/2 -/2¼	-/2	-/2 -/2¼	-/2 1/16	-/1⅝
Heavy oils	,,	-/3½	-/2½ -/3	-/2¼	-/2¾ -/3	-/3	-/3
Carbolic Acid, 60's	,,	—	1/7½ 1/8	1/8½	1/7 1/7½	1/7½ 1/8	1/7
Naphthalene, crude drained salts	per ton	—	42/6 45/-	40/- 42/6	47/6	47/6 50/-	—
,, pressed	,,	—	60/-	63/-	60/- 62/6	67/6	—
,, whizzed	,,	—	—	—	70/- 72/6	70/-	65/-
Anthracene	per unit	-/2	-/1⅜	-/1½	-/1¼	-/1¼	—

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

DRAUGHTSMAN. 2476, Burtons, Strand, W.C.
TRAVELLER. No. 5361.
SALESMEN (COAL). No. 5358.
JUNIOR ANALYST. 2478, Burtons, Strand, W.C.
GENERAL CLERK AND STOREKEEPER. No. 5363.
YOUTHS FOR INSTALLATION WORK (AUSTRALIA). No. 5360.

Situations, &c., Wanted.

AGENT OR SECRETARY. No. 5356.
SULPHATE PLANT REPAIRER, &c. Davis, Shepherd's Bush.
MANAGER OR SUPERINTENDENT OF COMMERCIAL DEPARTMENT. G., 35, Burchell's Advertising Offices, Liverpool.
ASSISTANT. No. 5362.

Plant, &c. (Second-Hand), For Sale.

OLD GAS-WORKS PLANT. Edinburgh and Leith Gas Commissioners.
STATION METER. Oldbury Gas Department.

Meeting.

EUROPEAN GAS COMPANY. Salisbury House. March 14, 2.30 o'clock.

Stocks and Shares.

CARDIFF GASLIGHT AND COKE COMPANY, By Tender. March 14.
DARTFORD GAS COMPANY. By Auction. March 14.
HARROW AND STANMORE GAS COMPANY. By Auction. March 14.
LOWESTOFT WATER AND GAS COMPANY. By Auction. March 14.
TENDRING HUNDRED WATER COMPANY. By Auction. March 14.

TENDERS FOR

Burners and Brackets.

DUBLIN CORPORATION. Tenders by March 9.

Coal.

FORFAR GAS DEPARTMENT. Tenders by March 10.
SHEPPY GAS COMPANY. Tenders by March 7.

Exhauster, Condensers, Scrubber, Purifiers, &c.

CUDWORTH URBAN DISTRICT COUNCIL. Tenders by March 7.
SUTTON-IN-ASHFIELD URBAN DISTRICT COUNCIL (Purifiers, &c.) Tenders by March 20.

Gasholder and Tank.

CUDWORTH URBAN DISTRICT COUNCIL. Tenders by March 7.

General Stores (Bolts and Nuts, Yarn, Oils and Grease, Shovels, Picks, Lime, Iron and Steel, Ironmongery, Glass, Castings, &c.).

HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD. Tenders by March 4.
STOCKPORT GAS DEPARTMENT. Tenders by March 4.

Glassware.

DUBLIN CORPORATION. Tenders by March 9.

Mantles.

DUBLIN CORPORATION. Tenders by March 9.

Meters.

STOCKPORT GAS DEPARTMENT. Tenders by March 4.

Pipes, &c.

STOCKPORT GAS DEPARTMENT. Tenders by March 4.

Retort House and Purifying House.

CUDWORTH URBAN DISTRICT COUNCIL. Tenders by March 7.

Weighing Machine.

CUDWORTH URBAN DISTRICT COUNCIL. Tenders by March 7.

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O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
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SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
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